

# THE AUTOMOBILE

## HOW NAZZARO WON THE TARGA FLORIO

PALERMO, April 25.—Italy is victorious. Of the first ten cars to finish this hard-fought fight seven are Italian and three French. First, second and third positions have been secured by the newcomers to automobiling; France takes fourth, sixth and tenth positions. Nazarro on a Fiat is the victor, at an average speed of 33.45 miles an hour, with Lancia on the same make of machine twelve minutes later and Fabry's Itala in third position.

that test the most powerful brakes. It is the thousand-bend course, for of the 92.47 miles forming the circuit there is only one stretch that can lay claim to be a straightaway run, and there are portions of the circuit where the road winds about on itself in the most intricate and perplexing manner. Three times round gives a total distance of 277.4 miles.

Opel, on an Opel machine, followed the leader; Wagner was



NAZZARO ON HIS VICTORIOUS FIAT PASSING THROUGH PETRALIA SOTTANI ON WILD SICILIAN COURSE.

After three or four days of rain the morning opened with a bright sky and gentle Sicilian breezes which wafted the aroma of citron and orange trees from the distance. Exactly at 5 o'clock Salvioni, an Italian piloting a French Pilain stripped touring machine went over the line amid the excited chattering of an Italian crowd encouraged by a cheer from the strong Franco element. Three times round a mountainous course, starting from the level of the sea and mounting up to giddy heights over one thousand meters above, with grades that stand up like walls, and descents

just behind him, getting away with a rush and a roar, the fastest of the lot. Lancia was about in the middle of the forty-six; Gauderman on a Bayard-Clement had the position that Albert Clement would have occupied had not the military martinets declared that he should not leave his barracks. Hémery was at the wheel of a Deluca-Daimler, an English-Italian combination. An Isotta-Fraschini, Italian construction, De Dietrich design, closed the list of competitors, forty-six in number.

Hardly had the last machine passed out of sight than the first



WAGNER AT HIGH SPEED PREVIOUS TO BEING PUT OUT OF COMMISSION BY THE SKIDDING OF HIS MACHINE.

to finish the round put in an appearance. It was Opel, followed at an interval of one minute by Wagner, with Trucco and an Isotta-Fraschini on his heels. The Italian had gained one minute on the French champion, but the position was soon lost, for a broken chain put a stop to his wild flight. Trucco made the fastest time of the first round, and as events proved, of the entire course, finishing the initial round in 2:39:8, or more than 34 miles an hour, a splendid performance over such a mountain track. Lancia was only four minutes slower, and Wagner proved the fastest of the Frenchmen.



LANCIA, WHO HELPED TO MAKE FIAT TEAM VICTORIOUS.

The outcome of the contest was very undecided at the end of the first round, and excitement increased at the official betting booths. From the outside news came through of accidents and cars broken down on the pitiless course. Salvioni, who set the pace with a Pilain, had finished his course in a ditch, a Berliet had broken an axle, Hieronymus, the German champion, had smashed three wheels, others were out of the race for unknown causes. Thirty-seven finished the first round.

On the second round Wagner made the fastest time and secured second position in the general classification, being only a few minutes behind Nazzaro. For a time there was excitement and enthusiasm in the French camp, and just a fear that Lancia, who started 56 minutes behind the Frenchman, might make faster time than the Vanderbilt winner. There was a roar in the distance and Duray rushed by to the delight of the French, followed later by Lancia, who started later, but beat the Dietrich man by less than a minute. When it was possible to calculate the positions, Nazzaro with a Fiat was found to be at the head, Wagner was second, Lancia third, Duray fourth and a couple of Itals fifth and sixth.

#### Wagner Breaks Down After Fast Run.

As the time for the first cars to finish the race drew near, excitement increased. Who would finish first, and would the first to finish be the victor? During the height of the clamor news went abroad that Wagner had abandoned. It was only too true, and instead of the light Darracq it was the heavy Dietrich with Duray at the wheel which was first to finish the course. French cheers had not died away when Lancia rushed up with a shorter elapsed time than Duray, followed a second later by Garcet on a Bayard-Clement. There only remained Nazzaro and Fabry, the Fiat and Itala drivers, who could possibly beat Lancia, and in any case the Italian victory was secure. Thirty-nine minutes after Lancia finished his course, Nazzaro rushed to the finishing line. He had started fifty-one minutes after him and was consequently the victor by twelve minutes. The strenuous nature of the contest is seen from a comparison of the times for the first ten machines. Between the arrival of Nazzaro's Fiat and Garcet's Bayard-Clement in tenth position there is only a difference of 36:6. The first three machines were separated by intervals of twelve and three minutes respectively, and several of the following positions were only decided by seconds.



Fiat had a most remarkable victory, for Lancia, Nazzaro and Weillschott were all among the first ten. Itala and Lorraine-Dietrich each had two with this select circle. The French, while admitting their defeat, point out that the two Isotta-Fraschini are really French machines being built in Italy under Lorraine-Dietrich designs.

Nazzaro, who in addition to the Targa, will pocket the first prize of \$3,000 in cash, was second in the last Gordon Bennett contest, in which Théry reached the pinnacle of his glory, and was second last year in the French Grand Prix, being beaten then by Szisz on a Renault, but defeating Albert Clement after the most exciting neck-and-neck races ever known. "Now we are ready for the Grand Prix," declare the Italians. "So are we," riposte the French.

#### Official Positions at Finish of the Targa Florio.

	H.	M.	S.
1. Nazzaro, Fiat (Italy), Michelin dismantable rims.	8	17	36
Average, 33.45 miles an hour.			
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3. Fabry, Itala (Italy), Michelin tires.....	8	32	40
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5. Cagno, Itala (Italy).....	8	39	16
6. Gabriel, Lorraine-Dietrich (France).....	8	39	46
7. Tamagni, Isotta-Fraschini (Italy).....	8	41	45
8. Weillschott, Fiat (Italy).....	8	42	52
9. Sorel, Isotta-Fraschini (Italy).....	8	52	0
10. Garcet, Bayard-A. Clément (France).....	8	53	14
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14. Dureste, Gobron (France).....	9	10	24
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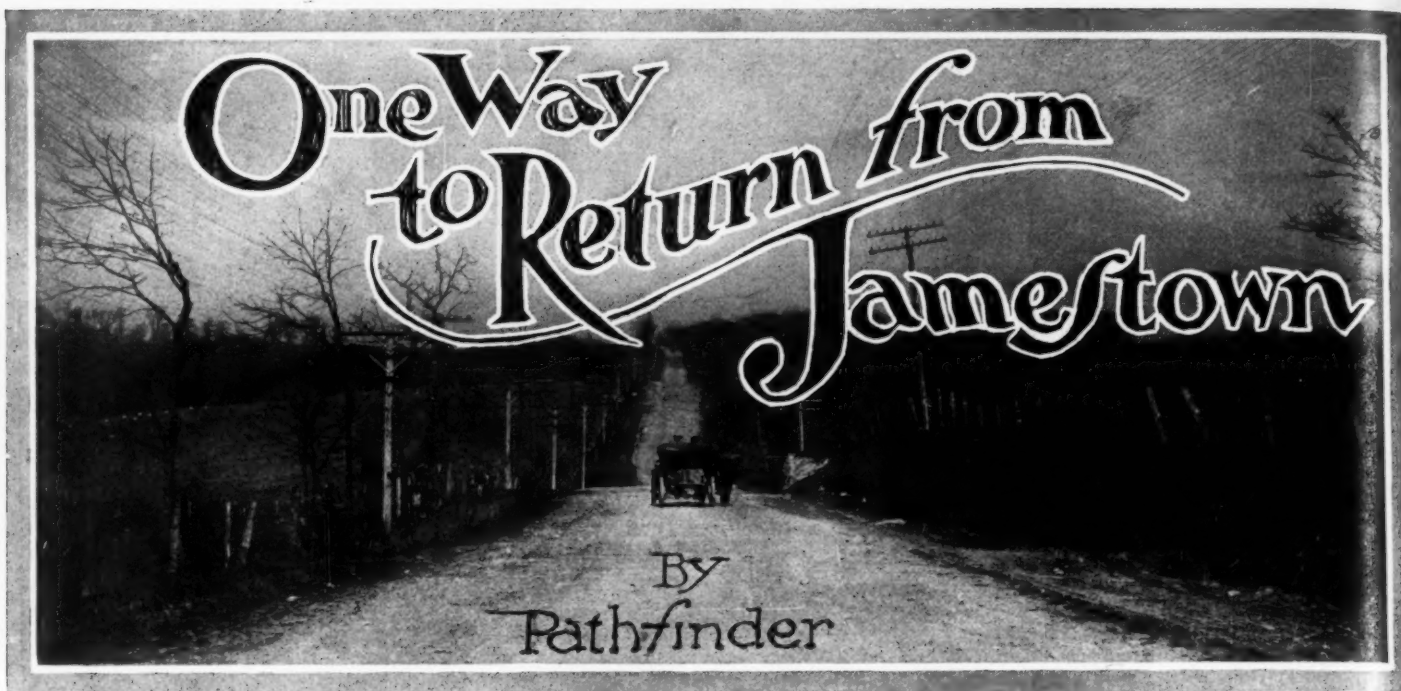


HIERONYMUS, A GERMAN VICTIM OF THE PITILESS COURSE.

Mechanical defects put very few machines out of the race, most of those not present at the finish being the victims of accidents due to the wild nature of the course. Wagner, who at the end of the second round appeared a certain winner, was forced to abandon, owing to his car skidding. His companion Hanriot was put out of commission in a similar manner. Both the Berliet machines skidded, smashing their wheels and breaking axles. Garcet, who was terribly fast on his Bayard-Clément, and looked certain for third place at one time, lost this position through a tire tearing off and his carburetor choking with dust.



FABRY AND HIS ITALA ON A ROAD IN THE MOUNTAIN WILDNESSE AROUND PETRALIA SOTTANI.



IF THERE WERE NONE OF THE BOTHERSOME WATER-BARS, THE NATIONAL HIGHWAY WOULD BE AN EXCELLENT TOURING ROAD.

WHEN the tourist who has made the trip to the Jamestown Exposition, has seen all the exhibits, been up and down the "war-path," looked over the naval display, and visited the various points of interest around Norfolk, he may find that he has not sufficient time at his disposal to return north by the all-land route via Richmond, Staunton, and the Shenandoah Valley. To those who wish a shorter return route, and yet desire to pay a visit to a historic section where much of the fighting of the Civil War took place, I would like to recommend the route which our party traversed on our recent return from the Exposition.

After much consultation and studying of maps, we decided to take the boat to Baltimore and then proceed westward over the old National Highway to a point where we would strike the main route from the Shenandoah Valley to Hagerstown. Our choice proved a most fortunate one.

There are two lines of boats from Norfolk and Old Point Comfort to Baltimore: the Old Bay Line and the Chesapeake Line. Probably the competition between them explains the comparatively low rates charged—\$8 for carrying the automobile and \$2 per passenger, including stateroom, if my memory serves me correctly. The first named line has the more modern boats, and should probably be given the preference, but travelers should make inquiries as to just what vessel is to sail on any particular date, because the best boats may be diverted for the use of some

excursion. Leaving Norfolk at 6 P.M., and Old Point Comfort an hour later, the boat docks at Baltimore early in the morning.

Baltimore has entirely recovered from the great fire of February, 1903, and the "burned district" is now a solid section of new modern buildings. An hour or two might well be devoted to a ride around the city. Baltimore is called the "Monumental City," and well deserves the name. On the principal parkways there is a monument every block. The supply of national heroes has been long ago exhausted, and the more recent monuments are to individuals so little known that the visitor constantly exclaims, "Who was he?" The Automobile Club of Maryland has very comfortable quarters in the downtown district, and keeps "open house" to visiting A. A. A. tourists at all hours.

There are splendid macadam roads all around Baltimore, and there are no less than five distinct routes to Ellicott City, where the National Highway proper commences. We went in our White steamer by way of Oella, a little hamlet entered by means of as sharp a "Devil's Elbow" as I have ever seen. Just beyond here we saw the place where the first railway construction in this country was undertaken, the same right of way being now a part of the Baltimore & Ohio Railroad. At Ellicott City begins the famous National Highway, which was opened for traffic almost exactly one hundred years ago. The road is now in the hands of a private company, which charges toll, but keeps the road in very



RIDGEVILLE'S EAGLE HOTEL STILL POSSESSES ITS L. A. W. SIGN.

'JONAS ELLICOTT' PRODUCED THE BOLD PLAN OF THIS BRIDGE."





HOMES LIKE THESE FREQUENTLY FOUND IN MARYLAND.

good condition, the only ground for criticism being the numerous water-brakes, which, if taken at speed, give both cars and passengers a severe shaking up.

Ridgeville, thirty-four miles from Baltimore and twenty-one miles from Ellicott City, is the first town of any size along the Pike. The Eagle Hotel here has a reputation for serving good meals, and our experience here led us to believe that its fame in this direction is well founded.

Just before reaching Frederick, we saw the famous old stone bottle which marks the approach to a long stone bridge, the age and style of which are best described by this inscription on the bottle:

"Jonas Ellicott first produced the bold plan of this bridge with arches of 65-foot span; built 1808-09."

Two miles further on we entered Frederick where, according to the poet, in the early days of the Civil War:

Up the street came the rebel tread,  
Stonewall Jackson riding ahead.  
Under his slouched hat left and right  
He glanced; the old flag met his sight.  
"Halt!"—the dust-browed ranks stood fast  
"Fire!"—out blazed the rifle blast.  
It shivered the window, pane and sash,  
It rent the banner with seam and gash.  
Quick as it fell, from the broken staff,  
Dame Barbara snatched the silken scarf.

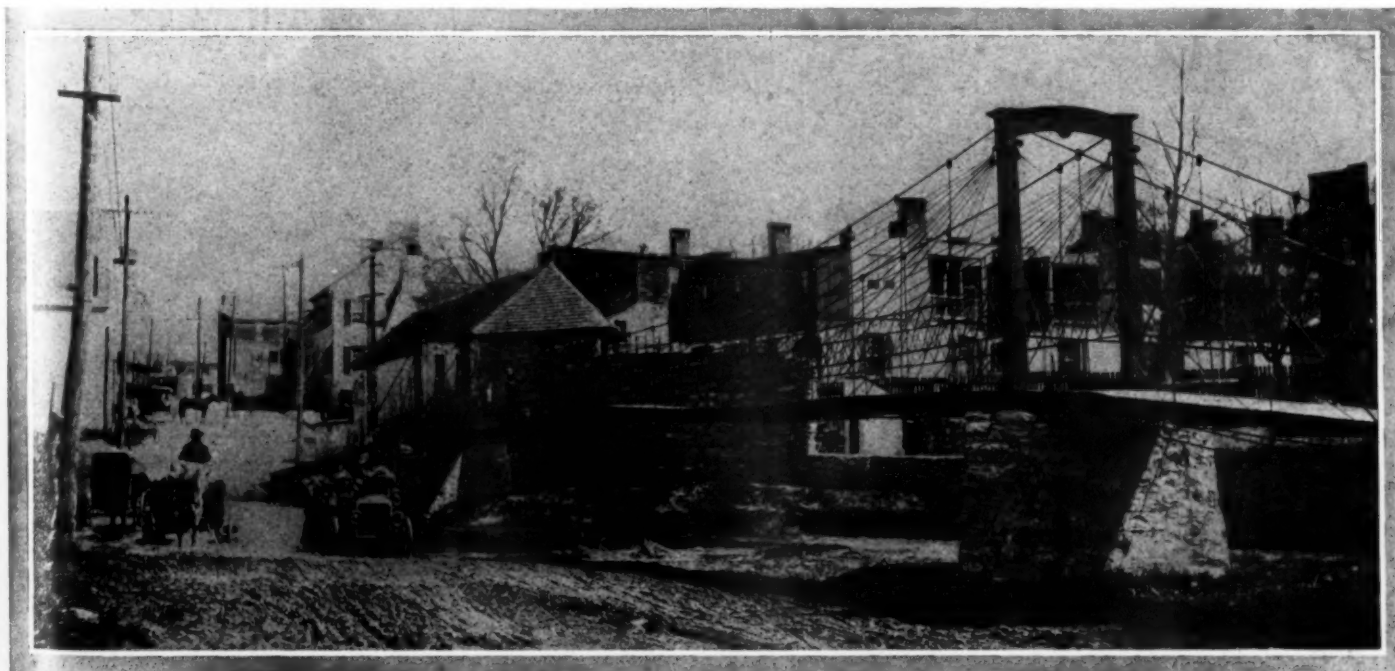


HARPER'S FERRY, BUSY, PICTURESQUE AND HISTORIC.

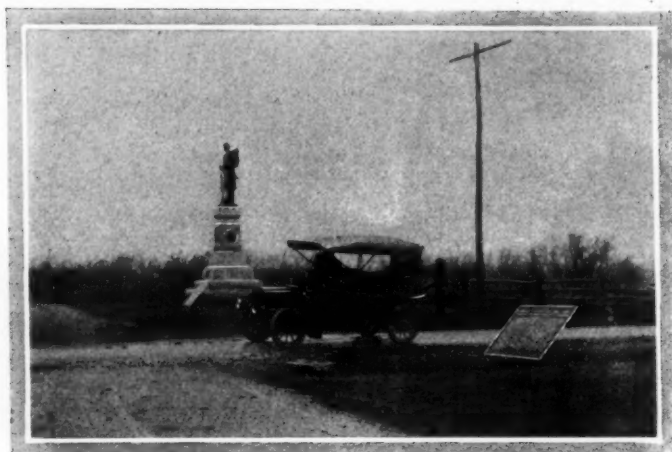
She leaned far out on the window-sill  
And shook it forth with a royal will.  
"Shoot if you must this old gray head,  
But spare your country's flag," she said.

On the further side of Frederick, the National Highway bends northwestward toward Hagerstown. We had in mind to go by a longer but much more interesting route, and, accordingly, left the highway at this point, and, bearing left into a well-kept toll-road, passed through Jefferson and Petersville, and then over a rough road to Knoxville, sixty-three miles from Baltimore. Here we came out from the hills to the valley of the Potomac river, which we followed for four miles, and then crossed the old iron bridge from Maryland into Harpers Ferry, West Virginia.

Harpers Ferry is at the confluence of the Potomac and Shenandoah rivers, and is a natural strategic point. Here it was that John Brown, in 1859, after his mad attempt to free the slaves, was captured by the National troops. No vestige now remains of the arsenal in which he and his daring band of twenty-one men made their last stand, but a simple monument marks the spot. The arsenal, it should be said, was evacuated and destroyed by the Northern soldiers a week after the firing on Fort Sumter, to prevent the vast stores contained therein from falling into the hands of an advancing body of Confederates. While the arsenal is gone, many of the buildings of the old town date back to antebellum times. There is a distinct fascination about a place



A GLIMPSE OF FREDERICK, WHERE BARBARA FREITCHIE WAVED HER FLAG FROM THE ATTIC WINDOW.



**ANTIETAM'S BLOODY BATTLEFIELD, WHERE THOUSANDS DIED.**

around which cluster so many historic memories, and we left Harper's Ferry with great reluctance. Four miles west, at Halltown station, we turned into the same road which we would have traversed had we returned by way of Richmond and Staunton. At Charlestown we again crossed a bridge over the Potomac back into Maryland, and, after passing through Sharpsburg, crossed

tourist should object to a few miles of bad going after having had more than one hundred miles of macadam.

The valley is finally reached at Fairfield, from which it is but an eight-mile stretch into Gettysburg. The magnificent battlefield there, and the two routes leading to Philadelphia, I have already described in the November 22 issue of *THE AUTOMOBILE*. I should point out, however, that the condition of the pikes is immeasurably better than when we made our trip last November. Considerable work has been done on the roads, including the smoothing out of many of the water-brakes. If the tourist returns to Philadelphia via York, Columbia, Lancaster, and Coatesville, he will find the Colonial Hotel at York, ninety miles from Philadelphia, a most desirable place to spend the night. In the morning it will be well worth his while to drive to the top of Reservoir Hill and have a view of the adjacent counties.

As I pointed out three weeks ago, the distance from Philadelphia to Cape Charles is 240 miles. That from Baltimore to Philadelphia by the route above described is about 250 miles. The tourist who makes this round trip, starting from and ending at Philadelphia, will agree with me, I think, that nowhere else will he find a route of approximately 500 miles which will make such a lasting impression upon his memory, particularly if undertaken while the Jamestown Exposition is in full swing.

Many whose touring has been limited to the New England and Middle Atlantic States have no idea of the wealth of scenic ter-



**WHITE STEAMER CLIMBING THE BLUE RIDGE—ROADS NONE TOO GOOD, BUT SCENERY SUPERB, AND TOURIST WELL REWARDED.**

the battlefield of Antietam. Here may be seen, on either side of the highway, numerous fine monuments, some in memory of the Blue and some to perpetuate the valor of the Gray.

Another ten miles and we were in Hagerstown, which is the first city of any size we had seen since leaving Baltimore, the distance between the two places being ninety-seven miles. This is the best place for the tourist to spend the night. By no means should he make the trip to Gettysburg, thirty-four miles further north, after nightfall, because the road between Hagerstown and Gettysburg offers no unusual scenic attractions. North of Waynesboro, Pa., it passes over the Blue Ridge, from the summit of which the view is indescribably beautiful. On this ridge there are several great hotels, a number of fine country estates, and one or two hunt clubs of wide reputation. After crossing the main ridge there is a smaller ridge to be crossed, and here will be found the only stretch of bad going on the entire journey. The road is not simply bad—it is fierce. It abounds in "Thank-you-ma'ams," it is deep with mud in wet weather, and is just wide enough for one vehicle. Those who drive gasoline machines which have no provision for feeding gasoline under pressure should make sure that their tanks are full before starting over this mountain. Otherwise, owing to the steepness of the grade, they may not be able to get gasoline to their carbureters. This stretch of road, however, is thoroughly passable, and no seasoned

ritory farther south. True it is that some effort is required to reach this section, but the indifferent roads between could be much worse, and, as American highways average, the traveling is well within the power of a sturdy car, capable of doing some climbing when occasion demands.



**TOLL GATES ARE FREQUENT AND DECIDEDLY ANNOYING.**



### SESSION OF A. L. A. M. MECHANICAL BRANCH.

HARTFORD, CONN., May 9.—This week the three days' meeting of the Mechanical Branch of the Association of Licensed Automobile Manufacturers is being held in this city. All day yesterday was devoted to a closed session held at the laboratory of Henry Souther, on Capitol avenue, the association's consulting metallurgical expert. Important subjects were taken up, the first being motor valve-timing, with a view to determining the exact point at which the inlet valves should fully open and close in order to obtain the maximum efficiency. This was followed by a series of tests on vanadium steel castings, and the results of the former are said to promise some information of an interesting character regarding this alloyed product. The subjects of detachable rims and the adoption of formulæ for the calculation of horsepower ratings were slated for the afternoon session.

To-day's session of the Mechanical Branch is being held at the Heublein Hotel. The subject is to be a discussion of the various standard cooling and lubricating systems in current use and a comparison of their merits. Upon the conclusion of this, the members will go in a body this afternoon to make their annual inspection of the association's laboratory, together with the new machinery which has been installed for the extensive tests of the metallurgical and physical properties of metals most largely used in automobile construction.

To-morrow (Friday) will be given over to the annual run. This will be about seventy-five miles, and the route lies through parts of the State that are distinguished both for their fine roads and their many historical associations. The start will be made at 9 A.M. from the laboratory, the first stretch being through Wethersfield and Rocky Hill to Middletown, about seventeen miles. This will be the first control, and here there will be a general shifting about, so that every engineer will have a chance to ride in the other fellow's car. Haddam is the next point on the route; it is a quaint old town that the march of progress has passed by, and is much the same to-day as it was generations ago. From here the route leads to Goodspeed's ferry, which will be utilized to cross to East Haddam—the lunch control.

The return trip will be up along the east bank of the Connecti-

cut, with the first afternoon control at Cobalt Crossing; other towns passed through being Portland and South Glastonbury, from the last of which the road leads to East Hartford and across the bridge and home. Though most of the roads included in the itinerary are fine macadam stretches there are some back country roads as well, besides one or two stiff hills.

The meetings have been well attended on both days, and it is expected that there will be additional members here to-morrow, bringing the total over sixty, who will be transported in the following cars: two Pope-Hartfords, Knox, Locomobile, two Thomas forties, Royal Tourist, Franklin, Corbin, Oldsmobile, Autocar, Studebaker, Pierce, Thomas Flyer, two Columbias and a Haynes.

### COMMERCIAL SHOW TO BE ANNUAL FIXTURE.

Being of the opinion that a sufficient number of manufacturers of commercial vehicles can be secured to make a showing by themselves, the executive committee of the National Association of Automobile Manufacturers, at its meeting last week, decided to inaugurate the first annual national exhibition of commercial vehicles, to be held in conjunction with the regular show of pleasure vehicles at Chicago this year, which will take place during the week of November 30 to December 7, under the auspices of the national association, as usual. It has long been evident that commercial vehicles could not satisfactorily be shown together with pleasure vehicles, and while there has been more or less complaint on this score on the part of the makers of the latter, the number of manufacturers concerned was not sufficient to permit of the remedy now decided upon. There will be but one admission charged to both separate sections of the show, though it is expected that admission to the commercial end will be very largely by invitation, and to that end exhibitors will be liberally supplied with admissions. Those present were: Albert L. Pope, S. T. Davis, Jr., W. T. White, W. R. Innis, C. C. Hildebrand, M. J. Budlong, George W. Bennett and William Mitchell Lewis. R. D. Chapin, E. R. Thomas Motor Company, was elected to membership, vice Ezra Kirk, resigned, and James Joyce, American Locomotive Company, was elected in place of H. F. Ball.

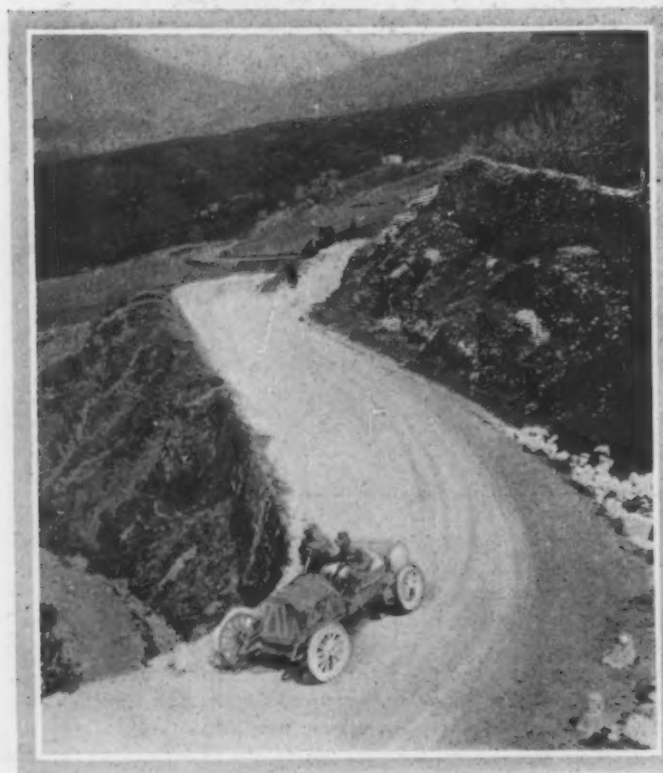


GOING OVER THE ROUTE OF THE A. L. A. M. ENGINEERS' RUN TO BE HELD MAY 10. H. P. MAXIM, CHIEF ENGINEER OF ELECTRIC VEHICLE CO., AND H. I. CLINTON, A. L. A. M., IN 24-H.P. COLUMBIA, NEAR GOODSPEED'S FERRY.



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to finish the round put in an appearance. It was Opel, followed at an interval of one minute by Wagner, with Trucco and an Isotta-Fraschini on his heels. The Italian had gained one minute on the French champion, but the position was soon lost, for a broken chain put a stop to his wild flight. Trucco made the fastest time of the first round, and as events proved, of the entire course, finishing the initial round in 2:39:8, or more than 34 miles an hour, a splendid performance over such a mountain track. Lancia was only four minutes slower, and Wagner proved the fastest of the Frenchmen.



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WHEN the tourist who has made the trip to the Jamestown Exposition, has seen all the exhibits, been up and down the "war-path," looked over the naval display, and visited the various points of interest around Norfolk, he may find that he has not sufficient time at his disposal to return north by the all-land route via Richmond, Staunton, and the Shenandoah Valley. To those who wish a shorter return route, and yet desire to pay a visit to a historic section where much of the fighting of the Civil War took place, I would like to recommend the route which our party traversed on our recent return from the Exposition.

After much consultation and studying of maps, we decided to take the boat to Baltimore and then proceed westward over the old National Highway to a point where we would strike the main route from the Shenandoah Valley to Hagerstown. Our choice proved a most fortunate one.

There are two lines of boats from Norfolk and Old Point Comfort to Baltimore: the Old Bay Line and the Chesapeake Line. Probably the competition between them explains the comparatively low rates charged—\$8 for carrying the automobile and \$2 per passenger, including stateroom, if my memory serves me correctly. The first named line has the more modern boats, and should probably be given the preference, but travelers should make inquiries as to just what vessel is to sail on any particular date, because the best boats may be diverted for the use of some

excursion. Leaving Norfolk at 6 P.M., and Old Point Comfort an hour later, the boat docks at Baltimore early in the morning.

Baltimore has entirely recovered from the great fire of February, 1903, and the "burned district" is now a solid section of new modern buildings. An hour or two might well be devoted to a ride around the city. Baltimore is called the "Monumental City," and well deserves the name. On the principal parkways there is a monument every block. The supply of national heroes has been long ago exhausted, and the more recent monuments are to individuals so little known that the visitor constantly exclaims, "Who was *he*?" The Automobile Club of Maryland has very comfortable quarters in the downtown district, and keeps "open house" to visiting A. A. A. tourists at all hours.

There are splendid macadam roads all around Baltimore, and there are no less than five distinct routes to Ellicott City, where the National Highway proper commences. We went in our White steamer by way of Oella, a little hamlet entered by means of as sharp a "Devil's Elbow" as I have ever seen. Just beyond here we saw the place where the first railway construction in this country was undertaken, the same right of way being now a part of the Baltimore & Ohio Railroad. At Ellicott City begins the famous National Highway, which was opened for traffic almost exactly one hundred years ago. The road is now in the hands of a private company, which charges toll, but keeps the road in very



RIDGEVILLE'S EAGLE HOTEL STILL POSSESSES ITS L. A. W. SIGN.

'JONAS ELLICOTT PRODUCED THE BOLD PLAN OF THIS BRIDGE.'





HOMES LIKE THESE FREQUENTLY FOUND IN MARYLAND.

good condition, the only ground for criticism being the numerous water-brakes, which, if taken at speed, give both cars and passengers a severe shaking up.

Ridgeville, thirty-four miles from Baltimore and twenty-one miles from Ellicott City, is the first town of any size along the Pike. The Eagle Hotel here has a reputation for serving good meals, and our experience here led us to believe that its fame in this direction is well founded.

Just before reaching Frederick, we saw the famous old stone bottle which marks the approach to a long stone bridge, the age and style of which are best described by this inscription on the bottle:

"Jonas Ellicott first produced the bold plan of this bridge with arches of 65-foot span; built 1808-09."

Two miles further on we entered Frederick where, according to the poet, in the early days of the Civil War:

Up the street came the rebel tread,  
Stonewall Jackson riding ahead.  
Under his slouched hat left and right  
He glanced; the old flag met his sight.  
"Halt!"—the dust-browed ranks stood fast  
"Fire!"—out blazed the rifle blast.  
It shivered the window, pane and sash,  
It rent the banner with seam and gash.  
Quick as it fell, from the broken staff,  
Dame Barbara snatched the silken scarf.



HARPER'S FERRY, BUSY, PICTURESQUE AND HISTORIC.

She leaned far out on the window-sill  
And shook it forth with a royal will.  
"Shoot if you must this old gray head,  
But spare your country's flag," she said.

On the further side of Frederick, the National Highway bends northwestward toward Hagerstown. We had in mind to go by a longer but much more interesting route, and, accordingly, left the highway at this point, and, bearing left into a well-kept toll-road, passed through Jefferson and Petersville, and then over a rough road to Knoxville, sixty-three miles from Baltimore. Here we came out from the hills to the valley of the Potomac river, which we followed for four miles, and then crossed the old iron bridge from Maryland into Harpers Ferry, West Virginia.

Harpers Ferry is at the confluence of the Potomac and Shenandoah rivers, and is a natural strategic point. Here it was that John Brown, in 1859, after his mad attempt to free the slaves, was captured by the National troops. No vestige now remains of the arsenal in which he and his daring band of twenty-one men made their last stand, but a simple monument marks the spot. The arsenal, it should be said, was evacuated and destroyed by the Northern soldiers a week after the firing on Fort Sumter, to prevent the vast stores contained therein from falling into the hands of an advancing body of Confederates. While the arsenal is gone, many of the buildings of the old town date back to ante-bellum times. There is a distinct fascination about a place



A GLIMPSE OF FREDERICK, WHERE BARBARA FREITCHIE WAVED HER FLAG FROM THE ATTIC WINDOW.



ANTIETAM'S BLOODY BATTLEFIELD, WHERE THOUSANDS DIED.

around which cluster so many historic memories, and we left Harper's Ferry with great reluctance. Four miles west, at Halltown station, we turned into the same road which we would have traversed had we returned by way of Richmond and Staunton. At Charlestown we again crossed a bridge over the Potomac back into Maryland, and, after passing through Sharpsburg, crossed

tourist should object to a few miles of bad going after having had more than one hundred miles of macadam.

The valley is finally reached at Fairfield, from which it is but an eight-mile stretch into Gettysburg. The magnificent battlefield there, and the two routes leading to Philadelphia, I have already described in the November 22 issue of *THE AUTOMOBILE*. I should point out, however, that the condition of the pikes is immeasurably better than when we made our trip last November. Considerable work has been done on the roads, including the smoothing out of many of the water-brakes. If the tourist returns to Philadelphia via York, Columbia, Lancaster, and Coatesville, he will find the Colonial Hotel at York, ninety miles from Philadelphia, a most desirable place to spend the night. In the morning it will be well worth his while to drive to the top of Reservoir Hill and have a view of the adjacent counties.

As I pointed out three weeks ago, the distance from Philadelphia to Cape Charles is 240 miles. That from Baltimore to Philadelphia by the route above described is about 250 miles. The tourist who makes this round trip, starting from and ending at Philadelphia, will agree with me, I think, that nowhere else will he find a route of approximately 500 miles which will make such a lasting impression upon his memory, particularly if undertaken while the Jamestown Exposition is in full swing.

Many whose touring has been limited to the New England and Middle Atlantic States have no idea of the wealth of scenic ter-



WHITE STEAMER CLIMBING THE BLUE RIDGE—ROADS NONE TOO GOOD, BUT SCENERY SUPERB, AND TOURIST WELL REWARDED.

the battlefield of Antietam. Here may be seen, on either side of the highway, numerous fine monuments, some in memory of the Blue and some to perpetuate the valor of the Gray.

Another ten miles and we were in Hagerstown, which is the first city of any size we had seen since leaving Baltimore, the distance between the two places being ninety-seven miles. This is the best place for the tourist to spend the night. By no means should he make the trip to Gettysburg, thirty-four miles further north, after nightfall, because the road between Hagerstown and Gettysburg offers no unusual scenic attractions. North of Waynesboro, Pa., it passes over the Blue Ridge, from the summit of which the view is indescribably beautiful. On this ridge there are several great hotels, a number of fine country estates, and one or two hunt clubs of wide reputation. After crossing the main ridge there is a smaller ridge to be crossed, and here will be found the only stretch of bad going on the entire journey. The road is not simply bad—it is fierce. It abounds in "Thank-yema'ams," it is deep with mud in wet weather, and is just wide enough for one vehicle. Those who drive gasoline machines, which have no provision for feeding gasoline under pressure should make sure that their tanks are full before starting over this mountain. Otherwise, owing to the steepness of the grade, they may not be able to get gasoline to their carbureters. This stretch of road, however, is thoroughly passable, and no seasoned

ritory farther south. True it is that some effort is required to reach this section, but the indifferent roads between could be much worse, and, as American highways average, the traveling is well within the power of a sturdy car, capable of doing some climbing when occasion demands.



TOLLGATES ARE FREQUENT AND DECIDEDLY ANNOYING.



### SESSION OF A. L. A. M. MECHANICAL BRANCH.

HARTFORD, CONN., May 9.—This week the three days' meeting of the Mechanical Branch of the Association of Licensed Automobile Manufacturers is being held in this city. All day yesterday was devoted to a closed session held at the laboratory of Henry Souther, on Capitol avenue, the association's consulting metallurgical expert. Important subjects were taken up, the first being motor valve-timing, with a view to determining the exact point at which the inlet valves should fully open and close in order to obtain the maximum efficiency. This was followed by a series of tests on vanadium steel castings, and the results of the former are said to promise some information of an interesting character regarding this alloyed product. The subjects of detachable rims and the adoption of formulæ for the calculation of horsepower ratings were slated for the afternoon session.

To-day's session of the Mechanical Branch is being held at the Heublein Hotel. The subject is to be a discussion of the various standard cooling and lubricating systems in current use and a comparison of their merits. Upon the conclusion of this, the members will go in a body this afternoon to make their annual inspection of the association's laboratory, together with the new machinery which has been installed for the extensive tests of the metallurgical and physical properties of metals most largely used in automobile construction.

To-morrow (Friday) will be given over to the annual run. This will be about seventy-five miles, and the route lies through parts of the State that are distinguished both for their fine roads and their many historical associations. The start will be made at 9 A.M. from the laboratory, the first stretch being through Wethersfield and Rocky Hill to Middletown, about seventeen miles. This will be the first control, and here there will be a general shifting about, so that every engineer will have a chance to ride in the other fellow's car. Haddam is the next point on the route; it is a quaint old town that the march of progress has passed by, and is much the same to-day as it was generations ago. From here the route leads to Goodspeed's ferry, which will be utilized to cross to East Haddam—the lunch control.

The return trip will be up along the east bank of the Connecti-

cut, with the first afternoon control at Cobalt Crossing; other towns passed through being Portland and South Glastonbury, from the last of which the road leads to East Hartford and across the bridge and home. Though most of the roads included in the itinerary are fine macadam stretches there are some back country roads as well, besides one or two stiff hills.

The meetings have been well attended on both days, and it is expected that there will be additional members here to-morrow, bringing the total over sixty, who will be transported in the following cars: two Pope-Hartfords, Knox, Locomobile, two Thomas forties, Royal Tourist, Franklin, Corbin, Oldsmobile, Autocar, Studebaker, Pierce, Thomas Flyer, two Columbias and a Haynes.

### COMMERCIAL SHOW TO BE ANNUAL FIXTURE.

Being of the opinion that a sufficient number of manufacturers of commercial vehicles can be secured to make a showing by themselves, the executive committee of the National Association of Automobile Manufacturers, at its meeting last week, decided to inaugurate the first annual national exhibition of commercial vehicles, to be held in conjunction with the regular show of pleasure vehicles at Chicago this year, which will take place during the week of November 30 to December 7, under the auspices of the national association, as usual. It has long been evident that commercial vehicles could not satisfactorily be shown together with pleasure vehicles, and while there has been more or less complaint on this score on the part of the makers of the latter, the number of manufacturers concerned was not sufficient to permit of the remedy now decided upon. There will be but one admission charged to both separate sections of the show, though it is expected that admission to the commercial end will be very largely by invitation, and to that end exhibitors will be liberally supplied with admissions. Those present were: Albert L. Pope, S. T. Davis, Jr., W. T. White, W. R. Innis, C. C. Hildebrand, M. J. Budlong, George W. Bennett and William Mitchell Lewis. R. D. Chapin, E. R. Thomas Motor Company, was elected to membership, vice Ezra Kirk, resigned, and James Joyce, American Locomotive Company, was elected in place of H. F. Ball.



GOING OVER THE ROUTE OF THE A. L. A. M. ENGINEERS' RUN TO BE HELD MAY 10. H. P. MAXIM, CHIEF ENGINEER OF ELECTRIC VEHICLE CO., AND H. I. CLINTON, A. L. A. M., IN 24-H.P. COLUMBIA, NEAR GOODSPEED'S FERRY.



FIRST APPEARANCE OF THE SIX-WHEEL AUTOMOBILE.

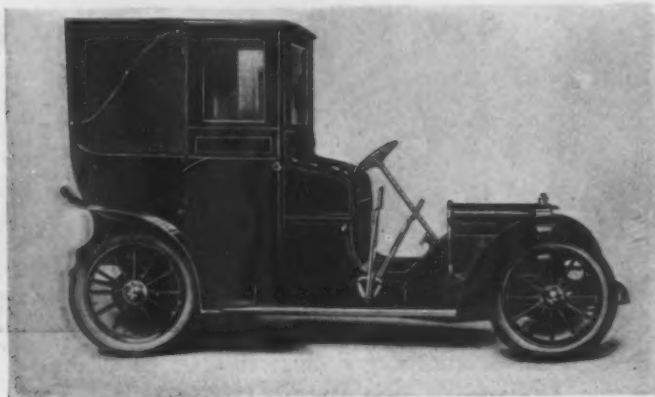
**NOVEL SIX-WHEEL CHASSIS DESIGNED BY PRATT.**

With the present four-wheel construction, automobiles appear to have reached their limit of wheelbase, and if further length is required it appears likely that the six-wheel type, already in use in Europe, will have to be adopted. Charles T. Pratt, president of the Pratt Chuck Works, of Frankfort, N. Y., has designed and secured patents on a vehicle of this nature. The front and intermediate pair of wheels are steerable, the intermediate pair turning in a lesser angle than the leading pair, power being supplied from a 75-horsepower gasoline engine to the rear pair of wheels only through the medium of an ordinary transmission gear and two-part rear axle shaft. The truck frame is so flexible that any of the four rear wheels may be raised or lowered to a considerable degree without reference to the others and without binding the driving mechanism or straining the frame. An advantage of the machine is that the additional pair of wheels prevents skidding and the two pairs of steering wheels also afford a much better control in directing the course of the vehicle. The car has a wheelbase of fourteen feet, one of the longest ever made, and is built to carry seven people, though additional seats may be added as desired.

**ABOUT THE THOMAS MOTOR CAB.**

The E. R. Thomas Motor Company, of Buffalo, motor cabs and town cars, have a four-cylinder, water-cooled motor, three speeds forward and reverse, selective transmission, and a shaft drive. The weight of the car is slightly over 1,500 pounds, and the wheels and tires are larger than have been used on cars of this weight or for this purpose before. The designs for these cars were worked out by Gustave Chedru, head of the foreign designing department of the company, who has made a careful and exhaustive study of the cab business in France, and who has designed the cab to embrace the qualities of the French article, with the different essentials incident to the requirements of the American public.

As soon as the plans were completed, months ago, it was found that a separate plant and special machinery would be necessary for the making of this class of cars. Deliveries of these cars will be made early in the fall.



THOMAS MOTOR CAB, THE LATEST THOMAS PRODUCTION.

**BOSTON'S SHOW TO BE FOR AUTOS ONLY.**

Boston, May 5.—The Boston Automobile Dealers' Association has at last taken the bull by the horns, so to speak, and has absolutely divorced the boat interests from its annual show. Practically ever since automobile shows began in this section the boat makers and the automobile manufacturers have exhibited side by side. But the automobile business has grown by such leaps and bounds and the boat business has increased so rapidly that for the past few years it has been absolutely impossible for all parties that wished to secure space in the Mechanics Building, the largest show building in New England. For some years past, therefore, it has been necessary to hold overflow shows in other buildings, and these have been anything but satisfactory to the management or to the exhibitors. When the show was held last March it became very plain that something radical would have to be done next year. The result was the decision of the Dealers' Association at a recent meeting to admit only automobiles and accessories to their annual show, and the concurrent decision of the New England Engine and Boat Association, backed by the National Association of Engine and Boat Manufacturers, to hold a show of its own in Mechanics Building the week beginning January 27, 1908. The automobile show will be held as usual in the middle of March, and Chester I. Campbell will manage both exhibitions.

Besides the general congested condition of the past shows, the situation as regards space was aggravated by the recent action of the Motor and Accessories Manufacturers' Association in deciding to exhibit in Boston next year. This association cut out the Boston show last March and some of its members thought it was a mistake. Therefore next spring all the accessories makers will be represented and they have already taken 10,000 square feet of exhibition space. This will give room for the display of new novelties, of which New England produces many.

**CHINA AS AN AUTOMOBILE MARKET.**

United States Consul Wilbur T. Gracey, writing from Tsingtau, states that there appears to be an excellent opportunity for the introduction of automobiles into the colony of Kiachow, his report reading:

There are at present only one American and two German machines in this city, but there is no reason why automobiles could not be used here to a large extent. The roads throughout the colony are excellent, being made through solid rock in many places, and all well macadamized. They run for a distance of 30 or 40 miles into the surrounding country, and with the gradual slope of the hills, about 15° to 20°, would be excellent for automobiles.

I believe that a cheap grade of automobiles could be introduced here for general use. They must be made to compete with the carriages which are now in use. Ponies can be purchased here for about \$40 to \$50 each, are used in pairs, and can be kept at about \$7 per month for feed and \$7 for a hostler. Carriages are either open Victorias, closed broughams, or dog carts, and cost, respectively, about \$350, \$400, and \$100. Small automobiles which are good hill climbers might be introduced if they could be supplied at a low price. Gasoline can be purchased at about 10 cents per gallon, and arrangements could be made for a lower price if there was a call for larger quantities.

The best way to introduce automobiles would be to ship a small number to some local firm to be sold on commission. It would be difficult to introduce machines here through catalogues. If the automobile manufacturers in the United States will forward copies of their catalogues to this consulate this office will retain one copy and pass the others to parties who may be interested. In quoting prices the machine should be given complete, with lamps and all necessary adjuncts. Some of the German firms quote their goods not only complete in every detail, but including extra parts which are liable to wear quickly, such as tires, etc. It must be remembered that American machines must compete with low-priced German goods. There are a good number of motorcycles in use in this city, and there would undoubtedly be a good sale for cheap machines of this kind. In both automobiles and motorcycles one of the most important points to be considered is that the purchaser is three months distant from the United States, and in the event of the breaking of any part of his machine it will be laid up for several months before he can secure new parts. Simplicity of construction is therefore important. Some local dealer should be well supplied with extra parts.





**T**HERE are two kinds of automobile bodies, the ready-made and the made to measure, the difference between them being precisely that existing between the clothing store product and the article with which the sartorial expert covers your nakedness and hides your natural defects.

The man who lays down ten thousand dollars for a machine is in a position to pay the necessary quota to obtain the elegance and material comfort of which his automobile is worthy, and indeed modern tendency is towards greater elegance and more comfort in automobile bodies.

As can be readily imagined, the building of the highest class of automobile body demands the finest of materials, considerable skill and experience, and is not a task that can be rushed through in a few days. To form an idea of the nature of the work, to watch the up-building of the best bodies on the best chassis, and follow through all the processes from the day the bare machine enters the works to the moment it comes out in the glory of its graceful curves, its well-designed body, its convenient fittings and its mirror-like finish, one must spend a few hours wandering around the works of a reputable body builder.

At 218 and 220 West Eighty-fourth street, a few yards from Broadway, a large proportion of New York's automobile bodywork is turned out under the signature of Locke & Co. Incidentally the six-story factory generally contains an assortment of the latest models of foreign chassis awaiting their upper half, only equaled in importance by the annual shows.

#### Stages in the Growth of a Body.

The high-grade body, such as would grace a Fiat, a Mercedes, or other "de luxe" chassis, is put in hand weeks before the chassis makes its appearance at the carriage works. Frequently, indeed, a closed body begins its growth before the chassis for which it is intended has left its native land. The necessity for this will be obvious when it is learned that the best closed bodies require three to four months to build.

The first stage in the body construction is a full size drawing on a blackboard, made to fit and harmonize with the chassis from blue prints of the latter. Customer and designer examine the

work with critical eye, modifying, improving and changing until both are satisfied. A working draft follows, and when this and the patterns are completed structural work is commenced. With very few exceptions, all high-class closed bodies are built up of wood and aluminum strengthened with iron stays. An open touring body is, with the exception of the frame and the stiffening irons, built up wholly of aluminum. Practice, of course, varies in different factories, but we are dealing with the method followed in the Locke works as descriptive of the highest development

in the modern art of automobile body building.

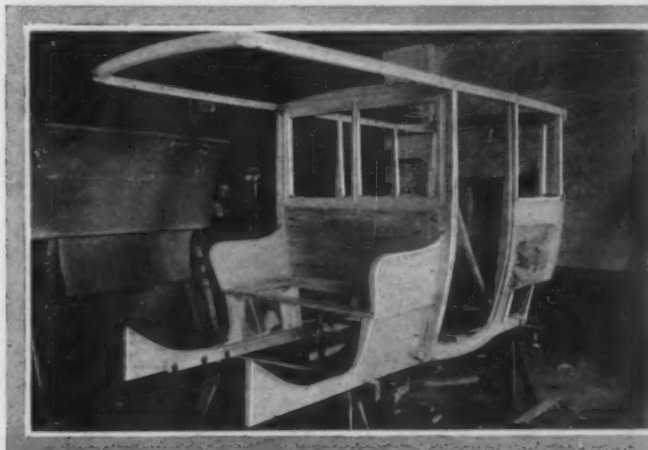
#### Making a Combination Wood and Metal Body.

For the frame work ash is generally employed. It combines strength and flexibility in desired proportions; it is nearly as strong as oak, without having the brittleness and unbending nature which is that wood's chief defect; it is stronger than hickory without having the excessive springiness of that wood. A machine which is constantly subjected to shocks must be constructed of materials of the very best quality and of such a nature as to combine strength with a certain amount of flexibility. For such panels as are not filled in with aluminum, what is known in the trade as white wood is employed. The varied parts forming the frame having been cut out according to patterns, they are assembled on a pair of trestles and form a skeleton body. There are big gaps between the wooden ribs which must be filled in. Sheet aluminum, about one-sixteenth of an inch thick, is the material employed. It would be almost impossible to accommodate wood to the curves of a stylish automobile body. Sheets of aluminum, cut out to pattern, can be made to fit the most difficult bends by judiciously beating with a hammer on the inside of the curves. Each plate is screwed down to the frame and its edges hidden by a beading of aluminum securely fastened in position, the heads of the nails being filed down so that nothing mars the smoothness of the finish, nor is any joint visible. The illustrations show a number of bodies in course of construction, some of which are in the skeleton stage, while others have been given their sheathing of aluminum.

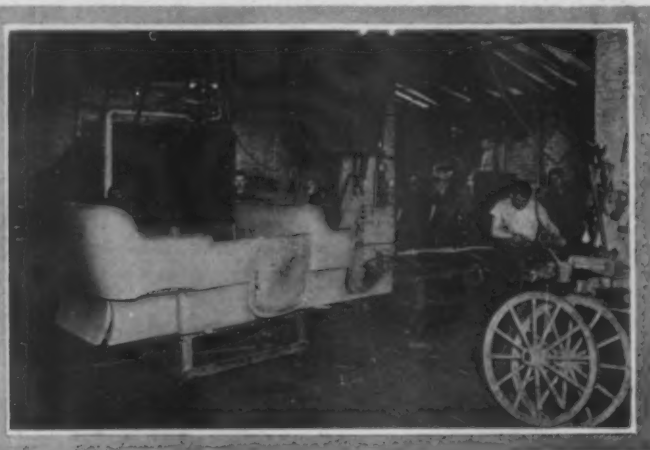
A rough coat of paint and the body is sent down to the blacksmith's shop in the lower depths, where it is strengthened and bound with metal stays. The amount of strengthening and the position of the stays depends entirely on the nature of the body, whether it is open or closed, whether it will carry a hood or be uncovered, and finally the type of hood used.

#### How the Upholsterers Make a Transformation.

Up-stairs it travels, to the well-lighted paint shop under the roof, where the preliminary filling coats are applied, coming



WOOD AND ALUMINUM BODY UNDER CONSTRUCTION.



TOURING BODY AWAITING ITS METAL STAYS.



WHERE THE UPHOLSTERY IS PREPARED.

down a few days later to be transformed by the upholsterers. Preparations have been made for its arrival, much of the upholstery is already mounted on canvas stretched on large wood frames. One of these is shown in the illustration and is the upholstery for the rear seats of a big touring body. The canvas is cut out of its frame and the complete piece fitted in position on the car. The finest quality of curled hair is used in this work, the covering being either hand buffed leather or various kinds of cloth, according to the nature of the car for which it is intended. Operating as carefully and as critically as a Worth dressmaker, the upholsterer fits the leather or cloth panels, upholsters arm-rests and various parts for which material cannot be made in advance, transforming the bare wood body into a luxurious, well-padded interior, pleasing to the eye and restful to the body.

By this time the chassis will probably have arrived. It is at once sent up to join its companion; the two are bolted together, and any modifications in detail which may seem necessary in order to obtain perfect harmony are here attended to. Now the painter comes on the scene. Filling stuff, rough coats, color coats, succeed one another in quick succession, each one being rubbed down until the previous coat shows through. Altogether a high-class body receives anything from seventeen to twenty coats of paint. The average is eighteen, but the exact number depends on how the finish comes out. If when the final operations are arrived at the body has not a glossy finish to suit the critical foreman, it is passed over and rubbed down again, until



FITTING A SUIT OF CLOTHES TO A FIAT.

the surface is as smooth as glass. Last of all the varnishing coats are given. A specially prepared room, with double floors, walls and roof, having varnished paper between them, is reserved for this delicate process. Automobile and workmen are left together in perfect stillness, no one being allowed to go near them and not a sound being uttered or an unnecessary movement made.

#### Finishing Touches to an Elegant Toilette.

Although practically finished when the machine leaves the varnishing shop, there still remain a number of small attentions which give a finishing touch to the creation. Mudguards and other fittings have been prepared and assembled as the work on the machine advanced, and are fixed at the last moment.

Even now the work is not terminated, for every self-respecting body must have a suit of clothes, a suit made of waterproof material, cut and fitted on the body itself. It is the only way to get a good fit; the workman operates with scissors and needle, cutting out here, taking in a stitch there, in much the same manner as a conscientious tailor would operate upon his clients, could he find any with sufficient patience to submit to such treatment.

Ninety-five per cent. of the work in the Locke & Co. factory is for automobiles. Here and there a horse carriage is being built side by side with an automobile body, and some rather instructive contrasts are formed by the juxtaposition of horse buggies of doubtful age with a coterie of automobile bodies of the first blood. There is a large amount of work, too, on retouching and repainting cars.



A GENERAL VIEW IN THE PAINT SHOP, WHERE EACH AUTOMOBILE RECEIVES TWENTY COATS.



## HORSEPOWER IN RELATION TO MOTOR DIMENSIONS\*

By F. W. LANCHESTER.

WHEN we discuss relative importance of bore and stroke as determining the h.p. of an engine, we have to consider the question of engine speed as limited by inertia and the strength of the materials employed. We may either suppose the maximum to be reached when the material is stressed up to its elastic limit by the inertia of the reciprocating parts, or at some stated point short of this extreme. In any case, the first step in the solution of the problem is the determination of the mass of the reciprocating parts in terms of the bore and stroke, in order that the conditions of  $\sigma$  (stress) = constant may be ascertained.

It is evident that to support a given pressure the piston end will require to be of a thickness proportional to its diameter; this applies whether the form is flat, or conical, or whatever its shape; its mass will therefore vary as  $D^3$ . The piston ring, with its containing "junk" is also a part that evidently should preserve its geometrical proportion; its mass is, in any case, independent of the stroke, and therefore varies as  $D^3$ . The small and large ends of the connecting rod are also unaffected by the stroke, and their linear dimension requires to increase directly as  $D$ ; the same applies to the gudgeon pin and the lugs and belt of metal, by which the connecting rod stresses are taken by the piston; the mass of all these parts, therefore, varies as  $D^3$ . The only remaining portions are: the shank of the rod, which evidently varies as  $D^3 \cdot S$ ; and the "shell" of the piston, which is a rather doubtful quantity. If we assume that the length of the piston varies in the direct ratio of its diameter, then this also falls into line with the majority, and varies as  $D^3$ ; this probably is not exactly true, but very nearly so.

We thus have the shank portion of the rod varying as  $D^2 \cdot S$ , and the remainder of the major reciprocating parts as  $D^3$ , and as the shank only constitutes about .15 of the total mass, I propose to ignore the exception and take the mass of the reciprocating parts as a function of  $D$  only, and as proportional to  $D^3$ . The error will be small, and such as it is it will favor the long stroke.

Let  $R$  = revolutions per second, then:—

$$\text{H.P.} \propto D^3 \cdot S \cdot R, \quad (3)$$

and maximum inertia force  $\propto m \cdot R^2 \cdot S$ ; but this force is sustained by an area (the area of the rod), which varies as  $D^2$

or stress varies as  $\frac{m \cdot R^2 \cdot S}{D^2}$ , but  $m$  varies as  $D^3$ , so that stress

varies as  $D \cdot R^2 \cdot S$ , which, by the conditions, is constant. We can thus eliminate  $R$  in h.p. quotation (3) by dividing by the square root of the constant  $D \cdot R^2 \cdot S$ , and we get:

$$\begin{aligned} \text{H.P. varies as } & \frac{D^3 \cdot S}{\sqrt{D \cdot R^2 \cdot S}} \\ \text{or, H.P.} = & c \cdot D^{1.5} \cdot S^{0.5} \text{ or, } c \cdot D \cdot \sqrt{D \cdot S} \end{aligned} \quad (4)$$

where  $c$  is a constant.

In order to show the possible magnitude of error introduced by the neglect of the shank of the connecting rod, I have also worked the above calculation on the basis of  $m$  varies as  $D^3 \cdot S^2$ , which seems a sufficiently liberal allowance; we have:

$$\begin{aligned} \text{Stress varies as } & \frac{D^3 \cdot R^2 \cdot S^3}{D^2 \cdot S} \\ \text{H.P. varies as } & \frac{D^3 \cdot S^2}{D^2 \cdot S} = D \cdot S \end{aligned}$$

so the influence of our assumption is not, at most, very serious. As a rating rule I should feel disposed to support any values lying between  $n=1.5$  and  $n=1.6$  in the  $L^3$  law of § 5. Any value

between these limits would not leave much opening for a "special design." For the further purposes of the present paper I employ the form  $D^{1.5} \cdot S^{0.5}$ .

## Conditions of Least Weight.

It is evident that for any given type of design, there must be some particular proportion of stroke to diameter appropriate to the condition of *least weight*. By the term *type of design*, as here used, it is intended to convey the condition that, in different engines, the arrangement and function of the parts is identical, the parts compared each to each are situated in the same relation to each other, and are alike functionally.

The *proportion of least weight* may be different in engines designed on different plans; for instance, one engine with an open and another with a closed crank chamber; it may also be different where different materials are used for like parts of different density or thickness.

In order to determine the proportion of least weight for any given type, a trial design is first made, *preferably* about the proportions that are known to be near the mark. This design is then dissected into its functional components after the manner in which we treated the piston and connecting rod, and the weight of each component is separately considered as a variable, and expressed as a function of  $D$  and  $S$ . The results are then classified, all functions of like indices being lumped together, and the total weight calculated from the trial design is added up under each heading.

Either  $D$  or  $S$  is then eliminated (preferably the latter), by dividing by the appropriate power of the h.p. factor  $D^{1.5} \cdot S^{0.5}$ , which is, of course, constant, and so we have the weights of the different functional components expressed as functions of  $D$  alone, the total weight being the sum of the expression.

The next step is to differentiate in respect of  $D$ , and solve the resulting expression in the usual manner for zero value; the value of  $D$  so obtained will be the value appropriate to *least weight*. The corresponding value of  $S$  will then be obtained from the constant  $D^{1.5} \cdot S^{0.5}$ . The final design for least weight can then be made.

## Influence of Density and Stress on H.P. Developed.

We will now revert to the general expression (1) of § 4—

$$\text{H.P.} = \frac{\sigma^{1.5}}{\rho^{0.5}} \times \text{constant} \text{—and discuss the influence of changes}$$

in the physical attributes of the materials employed; i.e., variations of  $\sigma$  and  $\rho$ .

Translated into ordinary language the expression (1) shows:

*That in similarly-designed engines, the h.p. varies as the 1.5th power; that is, as the cube of the square root of the stress, and as the square root of the density of the materials employed.*

Now it is evident that the weight of the engine also will depend upon the variables  $p$  and  $l$ , and for the conditions of geometrical similarity the form of this expression is  $W = p \cdot l^3 \times \text{constant}$ ; (5) so that the h.p. per unit weight, which is the quantity which is

H.P.

of most interest to us—will be:

W.

$$\frac{\sigma^{1.5}}{\rho^{0.5}} \times \frac{p}{l^3} \times \frac{\left(\frac{\sigma}{\rho}\right)^{1.5}}{l} \quad (\times \text{constant}).$$

§

Let us denote the quantity  $\frac{\sigma}{\rho}$  by the symbol  $O$ , and term it

\*Paper read before The Institution of Automobile Engineers, London. Continued from page 742, issue of May 5.

the "specific strength" of the material; then we have:

$$\frac{\text{H.P.}}{W} = \frac{\phi^{1.5}}{l}$$

We have now the question of weight-saving in a nut-shell. The above expression shows that to which I have already drawn your attention—the importance of sub-dividing the power unit by employing a multiplicity of cylinders of individually small size, for we have the *h.p. per unit weight inversely as the linear dimension*, the latter, *l*, being the denominator in the above expression. We can also see at once the importance of employing materials of high *specific strength*; the form of the expression shows that if we can, by employing *all round* a higher grade of material, say of 10 per cent. greater specific strength, we shall effect a saving of weight of approximately 15 per cent.

Of course, it is not always possible to effect an improvement in the quality of the material in every part of a machine, and it is of considerable interest to us to ascertain where and how the saving in weight is most usefully effected.

#### Weight Saving Considered in Detail.

Let us, to fix our ideas, suppose that we have at our command two kinds of material, one of which has just four times the *specific strength* of the other; and let two carefully-designed engines be built to the same specification, one from each kind of material. Now it is evident that, part for part, the one engine can be built one-fourth the weight of the other. There may be some slight difficulties in design, owing to the slenderness of some of the parts, but we can brush this difficulty to one side by supposing the difference of *specific strength* to be wholly due to a 4 : 1 difference of density; that is,  $\sigma$  remains constant.

H.P.

So far we have accounted for the ——— varying in the direct W.

ratio of  $\rho$  only; but the one engine will not only be lighter than the other, but it will develop more power, for its reciprocating parts will give rise to less inertia and the revolution speed can be increased. The extent to which the revolution speed can be increased is in the inverse ratio of the square root of the weight of the parts, or in the case in point, the revolution speed can be doubled. Thus, the h.p. of the lighter engine will become

H.P.

twice as great as the heavier one, or its ——— will be  $4 \times 2$ ; that W.

is, eight times as great, which is  $4^{1.5}$  in accordance with the equation.

We thus see that on the former supposition of a 10 per cent. improvement in the material, producing (approximately) a 15 per cent. improvement in the power-weight factor, 10 per cent. of this improvement is due to the direct lightening of the engine and 5 per cent. to the increased power derived from the higher revolution speed rendered possible.

It is thus evident that by far the greater importance attaches, relatively speaking, to the quality of the material employed in the pistons and connecting rods, for these reciprocating parts do not usually exceed 10 per cent. of the total weight of the engine and attention given to this 10 per cent. is of as much effect as similar attention devoted to any other 50 per cent. of the engine. It is thus found advantageous to adopt the very highest class of material for pistons and connecting rods. For some years past I have employed a high grade of nickel steel, both for the connecting rod stampings and for the blanks from which the pistons are turned, and I believe that the results would justify even more attention still, being paid to the reduction of weight in these organs.

#### A Secondary Effect.

There is a secondary effect which must not be lost sight of, and which results in a saving of weight which is not obvious from a mere inspection of equation (6).

We have seen that the change in the power-weight factor, as due to  $\phi^{1.5}$ , takes the form of a saving of weight in the direct ratio of  $\phi$ , and in an increase of power in the relation  $\phi^{1.5}$ . But we may not want increased power; it is usually some stated power that is required, so that by equation (1)  $P$  will require

to vary inversely as  $\phi^{1.5}$ ; that is,  $l \propto \frac{1}{\phi^{1.5}}$ , substituting in equation (6) we have:

$$\frac{\text{H.P.}}{W} \propto \phi^{1.75}$$

under the conditions of stated h.p.; that is to say, h.p. = constant. This may be alternatively expressed by saying that for a given h.p. (for an engine of given number of cylinders), the weight varies *inversely*, as  $\phi^{1.75}$ .

The equation (1) may be written in the form:

$$\text{H.P.} = \sigma \cdot \phi^{1.5} P \times \text{constant.} \quad (7)$$

In this form the  $\sigma$  relates to the stress in the working fluid; that is, the cylinder pressure; taking this as constant we have h.p. varies as  $\phi^{1.5} P$ , and when h.p. is constant, we have  $\phi^{1.5} P =$

constant, or,  $l \propto \frac{1}{\phi^{1.75}}$ , which, substituted in equation (6),

gives the same result as before; i.e.,  $W \propto \frac{1}{\phi^{1.75}}$ .

We thus see that the saving of weight, to be effected by employing high-grade material, is even more than we had hitherto concluded, so that a 10 per cent. higher specific strength would give about 17.5 per cent., instead of 15 per cent., as previously concluded. The earlier figure was perfectly correct so long as the linear dimension is the constant, instead of the h.p.

#### Conditions of Least Weight—Continued.

The present method of investigating the proportions of *least weight* is comprehensive, and includes such appurtenances as ignition mechanism, fly-wheel, etc., and may even be extended to include the whole power transmission and change speed gear.

Under these circumstances, it is evident that there are certain factors that may be ignored as being independent of the variables  $D$  and  $S$ ; for example, the ignition organs, the valve heads, portions of the valve boxes, etc.; that is, (a) parts that are *essentially constant* (example, *sparking plugs*), and (b) parts that are constant in respect of h.p.; that is, vary as  $D \sqrt{D} \sqrt{S}$  (example, *valve heads*), and which consequently would vanish automatically in the process of calculation. As a general rule, in practice the whole of the valve and ignition gear may be thrown out at the start, though there may be exceptional cases in which parts of the valve gear must be taken into account.

(To be concluded.)

#### SOME OF THE USES OF ANTIMONY.

Antimony is a white metal which fuses at a low temperature and is readily vaporized, says the *Canadian Engineer*. It is of a laminated or crystalline texture and is very brittle. It is used in several valuable alloys, but is not used in the pure state; its most important alloys are type metal, britannia metal, pewter and various anti-friction metals. Type metal consists essentially of lead and antimony, with, frequently, the addition of tin, nickel or copper in small quantities. Britannia is a white-metal alloy much used for tableware, and consists of antimony, with tin, copper and bismuth. A similar alloy, containing, however, a smaller percentage of antimony, is pewter. The anti-friction alloys usually are known as babbitt metals. One of them consists of thirty parts of tin to five antimony and one of bismuth, but as is well known, various proportions are employed. Antimony has a hardening effect when added to lead; a small quantity of bismuth gives the alloy the property of expanding at the instant at which it solidifies, the result being a perfect cast from the mold.



## TYPES OF AUTOMOBILE TRANSMISSIONS\*

By E. H. BELDEN.

AT the outset it will be necessary to give some definition of transmission, which is one of the most improperly applied words in connection with the automobile industry. It is understood to mean, generally, change-speed gearing. In other words, the change of ratio and direction of motion between the rear wheels and motor, but that mechanism is only one element in the train of devices, which transmits the power of the motor to the road wheels. So, therefore, we will designate the change-speed gearing as the "gear-set," and leave the word transmission with a broader meaning, to apply to the entire moving mechanism between the motor shaft and the road wheels.

The available energy, at the road wheels of the automobile, is transmitted from the engine through what is commonly known as a "transmission or gear set." The gear set may be one of many types, but in any case it must perform the office of changing the direction and ratio of motion, between the engine and road wheels, at the option of the operator. Means must be provided for the compensation of the relative motion between the driving axle and frame of the car, to allow for the use of suitable spring suspension, without interference to the uniform transmission of motion. Compensation must also be provided to allow one road wheel to operate independently of the other. Connecting and disconnecting of transmission devices, from the motor, must be accomplished in such a manner that the car may

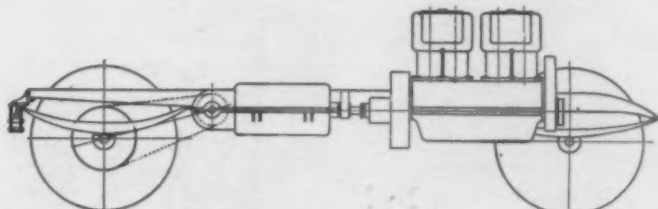


FIG. 1.—Usual arrangement of double chain drive.

be set in motion without shocks, sudden jerks, or danger of stalling the motor.

Let us now leave out of consideration the advantages or disadvantages of any particular type of "gear set," to which we shall revert later, and take up the advantages and disadvantages of two methods, *i. e.*, the transmission of motion from engine to road wheels by chain and by propeller shaft.

### The Double Chain Type.

During the early days of automobile designing it was considered desirable by the majority of the best engineers to use the double chain drive, as shown in Fig. 1. The chain drive was considered to be the more flexible, because the spring action was not deadened by the use of short propeller shaft, as shown in Fig. 2. The speed ratio could be easily changed by changing the size of the sprockets. It was considered to be the more efficient, because of the low efficiency of the bevel gears, when they were forced to transmit the enormous multiplied power of the larger engines. The frame could be hung lower when the double chain drive was used, because the solid rear axle could be dropped the same as the front. In the double chain type of transmission all of the gears, including the bevel, were relieved of the greater strains on account of the ratio of the sprockets.

The principal disadvantages of the chain type are the constant stretching of the chain while the pitch of the sprockets remains the same, producing shocks and noise as the teeth come in con-

tact with the chain rollers; the inability to provide suitable means for protecting the chain and sprockets from dust and mud; the excessive strain on the bearings of the road wheels caused by the pull of the chains, and the deadening effect on the springs caused by the angle of chains and distance rods. There are now being put upon the market three or four types of cars that are provided

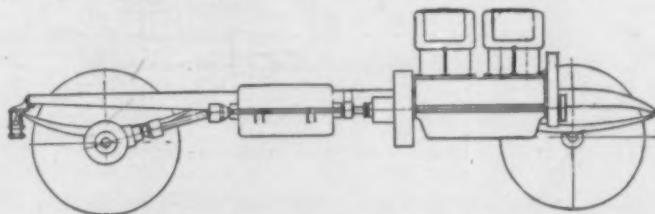


FIG. 2.—Power-wasting angle of shaft.

with cases to protect the chains. In each instance the construction of the chain cases are so unmechanical that there can be no doubt but what the propeller shaft will soon antiquate the chain type.

The mere fact that the manufacturers of automobiles, with the double chain drive, are forced to provide their cars with chain casings that cannot possibly prove of advantage to this type of transmission, for the reason that they are only a makeshift, expensive to build, unmechanical, only partially dust-proof and subject to the danger of being totally destroyed every time the chain breaks, is sufficient proof that this type of transmission is far from the ideal.

### Propeller Shaft Type.

Now that the trend of automobile designing has been constantly away from the chain types, we must admit that the bevel gears have been perfected, both in material and design, to such a degree that their efficiency and durability is equal to that of the chain type when operated under road conditions. Bevels can be changed to alter the ratio as readily as changing the sprockets and the lengthening or shortening of chains. The matter of lowering the frame has been taken care of by the use of a drop frame, as shown in Figs. 3, 4, 5, instead of a drop axle. The propeller shaft transmission has an advantage over the chain type of being completely enclosed, protected against dust and mud and always well lubricated. This enclosed transmission maintains constant efficiency and is practically noiseless.

The sliding "gear set," as shown in Figs. 6, 7, 8, has an average efficiency of about 78 per cent. The "transmission" efficiency (*i. e.*, the efficiency of all moving mechanism between the motor and wheels, including cardan joints), with the gear set between

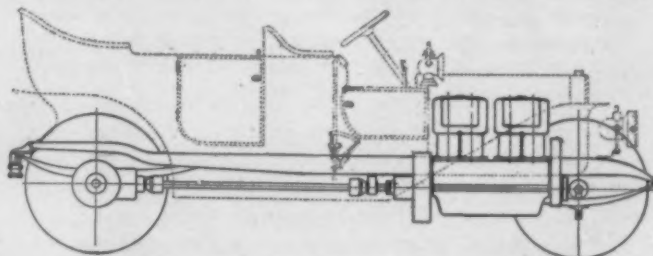


FIG. 3.—Shaft drive with gear box on rear axle.

the propeller shaft and motor, as shown in Fig. 2, has an average efficiency of about 67 per cent., while the average transmission efficiency of the more modern car, using the propeller shaft type, with the transmission in the rear axle, with no multiplied power in the cardan joints, is 88 per cent. The transmission efficiency

\*Paper read before the Engineers' Society of Western Pennsylvania.

of the "Belden system," with no multiplied power in either the cardan joints or bevel gears, as shown in Fig. 3, is 98 per cent.

After comparing carefully a number of efficiency tests on both the chain and propeller shaft types, we find that the chain type, when the chains are new, clean and well oiled, has about ten per cent. more efficiency than the propeller shaft type when

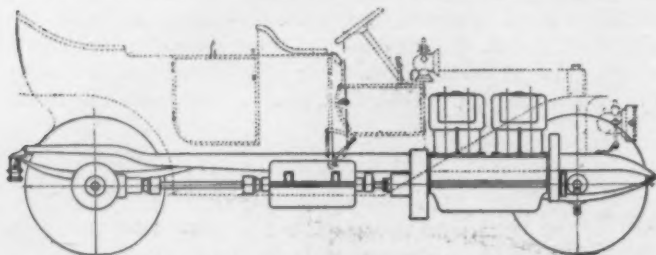


FIG. 4.—Design of shaft drive for maximum efficiency.

the shaft is placed at a great angle and forced to transmit the multiplied power of the gear set. But comparing the chains on modern cars under ordinary working conditions, with the chains exposed to mud and dust, as they usually are, and the propeller shaft type with the transmission in the rear axle, thereby eliminating the great angle of the shaft and the multiplied power in same, we find the efficiency decidedly in favor of the latter type, as is naturally to be expected under the circumstances.

#### Power Loss.

Engineers are agreed that the greater part of power loss of the transmission of motion in automobiles is in the propeller

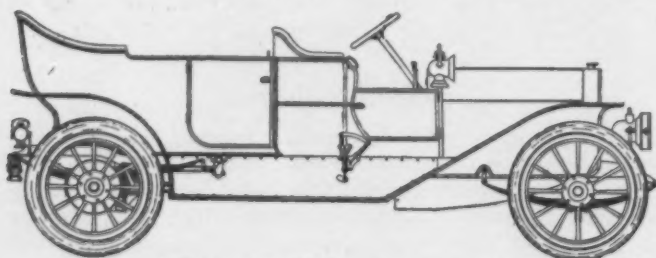


FIG. 5.—The Belden 30-horsepower car.

shaft and cardan joints, due altogether to the friction of the cardan joints when transmitting power at a great angle, as shown in Fig. 2.

Now, considering the fact that bevel gears are inefficient when under excessive strains, we must come to but one conclusion. The automobile of the future will be built on the lines of the car shown in Figs. 3-5, with the motor set back of the front axle. With the motor shaft in line with the rear axle (which will eliminate all loss of power in cardan joints); with large wheels to increase road clearance and decrease road shocks, as well as road resistance; with drop frame for the purpose of keeping the center of gravity low.

With "gear set" placed in the rear axle, for the following reasons:

*First.* To eliminate the transmitting of the multiplied power of the gear set through the propeller shaft and cardan joints.

*Second.* To allow sufficient road clearance midway between the front and rear axles, which could not be possible if the gear set is placed under the body, as shown in Fig. 4.

*Third.* So that the multiplied power will not pass through the bevel gears, but pass through more efficient gears, as arranged in the Belden type of transmission, thereby eliminating the inefficiency of the bevel-gear drive.

(To be continued.)

[EDITOR'S NOTE.—The illustrations referred to under the paragraph captioned Propeller Shaft Type, and denominated as Figs. 6, 7 and 8, picture change-speed gears of the different standard types and were necessarily held over to the second part.

#### FUEL CONSUMPTION IN MOTOR 'BUSES.

London omnibus companies using gasoline vehicles have discovered to their cost that there is an enormous waste in fuel owing to the inexperience of the drivers they are obliged to employ. A writer in *Le Poids Lourd* says that he has made consumption tests on a number of London 'buses, using a gasoline indicator on the main feed pipe, and is of opinion that one company having 100 vehicles in service has a loss of \$30,000 annually. Certain 'buses of a uniform type, and on the same roads, showed differences in fuel consumption reaching 42 per cent.; drivers in each case were equally capable.

The driver alone on a given car could vary the fuel consumption 25 per cent. per machine kilometer. This shows the need for constantly verifying the fuel consumption for each motor in order to maintain it in the most effective condition. The regulation of the carburetor should always be entrusted to an expert and should never be left for drivers and mechanics to do on the road. Too often the men remedy a loss of power by enlarging the hole in the *gicleur* and some have been known to use the pointed end of a file for this delicate operation.

Every motor 'bus repair shop should be fitted with the necessary instruments for testing not only the power developed but the fuel consumption per horsepower per hour. If these tests were thoroughly carried out every time a motor is dismantled for repairs a great saving would result. Drivers, most of them recruited from the ranks of horse drivers, do not sufficiently understand the mechanism of their machines. The disastrous effects on the consumption when a 'bus is stopped and allowed to run simply with the clutch withdrawn, should be pointed out to them; at such a time the gasoline consumption is higher than if the machine were running at its maximum speed. He should be made to understand that to restart his motor it is not necessary to flood the carburetor until gasoline runs onto the ground. He should be taught to throttle down gradually before stopping so as to have no need to use the brakes harshly. Another important point on which he should be instructed is the effect on the fuel consumption from an abuse of the change speed gear.

Generally motor 'bus drivers travel too fast. Often the last journey is a wild rush through deserted streets, the driver and conductor being only concerned to accomplish the stipulated number of journeys. A system of payment by journeys is better than payment by day, but it has its disadvantages; frequently passengers are left behind who would be able to board the 'bus if it were traveling at a moderate speed. A bonus system on fuel consumption, as is in use by railroad and steamship companies, should be introduced by gasoline omnibus companies. In Paris, where the high price of gasoline renders economy essential, each gasoline cab driver is allowed a fixed sum off his daily takings for fuel. Whatever he can economize by skillful driving is to the driver's personal benefit; naturally if the motor is at fault the driver speedily remedies the matter himself or causes the regulation to be made without delay at the repair shop.

#### ILLUSTRATING THE WORKING OF A CHAIN.

Hans Renold, Ltd., Manchester, showed at Olympia the latest improvements in silent driving chains, in which the links are not allowed to bear directly on the rivets, but carry removable hardened bushings which turn with the links, says *Engineering*. This arrangement gives to the rivets a bearing the full width of the chain. In order to demonstrate the principle embodied in the construction of these chains, this firm had an electric motor driving by means of a sprocket wheel and chain, an idle chain wheel on one side of the motor, and on the other side of the motor the disks of a stroboscope. The main chain is of the silent pattern. The transverse shaft carrying the stroboscope is fitted at its remote end with an arm bearing an eye-piece on a level with the slots in the disk, the slots being in line with the chain links and the wheel teeth. Viewed through the eye-piece, and when in motion, the teeth and chain appear practically at rest, and the positive contact between the two is shown in a very clear manner.



## CONSIDERED IN THE BUYING OF A SECOND-HAND CAR

By CHARLES B. HAYWARD.

**I**F a locomotive or a marine engine has a useful life of anywhere from ten to twenty-five years before finally being relegated to the scrap heap, why is it that an automobile reaches the same haven of rest in a mere fraction of that time? is a question very commonly asked. Or, to put it in a slightly different form: Why is it not possible to buy a second-hand automobile with the same assurance that any other piece of machinery could be bought in the open market? It is evident that the questioner places the automobile in a special category by itself, and to a large extent this is true; just why it should be so, is another matter entirely.

As a business, dealing in second-hand automobiles sprang up contemporaneously with their entrance into daily life—as soon as there were new automobiles, there were second-hand cars. Probably a man has to be pretty shrewd to sell anything at second-hand and make a living; at any rate, a second-hand dealer is always a second-hand dealer, whether his specialty be old clothes or automobiles. Paint and varnish are cheap, while talk is evanescent and only remembered by the buyer when he discovers his purchase to be something quite different from the glowing account of the salesman—the latter seldom remembers having promised anything of the kind. But how about buying a car that has been used from its original owner?

### Many Things to Be Considered.

Of course, all dealers are not dishonest by any means, nor given to making ambiguous statements, such as the automobile equivalent of David Harum's assurance to the clerical buyer of his horse that "he would stand without hitchin'." Whether dealer or individual seller, the statement that the car is "in good condition"—the "best of condition" or its equivalent is bound to be forthcoming. It is utterly meaningless, and may be disregarded, or at least not given any more weight than the grocer's statement when he makes the assurance that the eggs he is selling are "fresh laid"—he may have just laid them on the counter.

No car that has been used one or more seasons can be expected to be in the pink of condition—it is never that way but once, and that is when it is brand new, but given a good foundation to start with and reasonably decent care during its period of use and there is no reason why a secondhand car cannot be considered as an excellent investment. Depreciation is the greatest bugbear of the automobile owner—his new car loses 20 to 25 per cent. of its original value every year; it goes out of style and drops further and further down the price line with the passing of each season. Now this is not actual mechanical depreciation—after two years' use it is practically impossible to sell a car for more than 50 per cent. of its list price, but its actual depreciation with fairly good usage should not exceed 15 per cent., and much of the latter may be remedied by replacement and repair. It is still a good car, and can be had at a comparatively low price, but the buyer of a second-hand car expects to get a good one for next to nothing. There's the rub—alluring prices attract him far more than mechanical soundness. Next to expecting to become the owner of a big car—the second-hand buyer is always looking for the most for his money in the shape of size—the chief cause for dissatisfaction lies in the fact that he expects his purchase to be in a condition to take the road immediately and keep it. It usually does by showing a decided affection for a certain particular spot on the highway where it persists in standing without being hitched.

### Slight Defects and Ordinary Wear Immaterial.

Bearing in mind that it is not reasonable to expect to buy a car second-hand that will look or act as if it had just come out of the factory, due allowance must be made for ordinary wear and tear—what may aptly be termed legitimate wear. Mudguards,

headlights and the radiator form excellent indices of the manner in which a car has been used; if it has tried conclusions with sundry obstacles off and on, these parts will reveal it, and they may be taken as an indication that the remainder of the car has not come in for any greater degree of consideration. Naturally there is bound to be a great deal of wear where it cannot possibly be seen—in the motor itself, but the manner in which the latter operates will show whether it is such that a little overhauling will make it good or whether it has damaged to an extent that an outlay for repairs would be money wasted.

Observe the motor closely while it is running with the car standing—it may have an ominous knock in its interior; it may clank, sigh, hiss and groan as it labors, but these signs of infirmity need not necessarily condemn it. A loose big end or piston pin will cause one and leaky, poorly adjusted valves be responsible for the other, while worn out piston rings may account for the fact that the power developed is not all that it should be. Unfortunately, the average seller of a used car is not disposed to let the intending purchaser take it down for inspection, but much can be done by observation of its actions. The interior of the change-speed gear box can be inspected as well as the interior of the bevel-gear drive in case of the shaft-driven car, and the differential in either case. These parts are expensive to replace, and under abuse are short-lived, but with reasonable care are usually good for years of service. The object to be borne in mind throughout the entire inspection is whether, all things considered, the car is in such a shape that a reasonable outlay will render it fit for continued service.

### Make a Note of Repairs Needed.

To arrive at this conclusion, a note should be made of every repair and replacement that is needed. It is obvious that a car in which the gears are badly stripped, the differential worn and the motor in need of a number of replacements, is not a good investment even at a very low price. The wheels should be removed and the condition of the bearings noted, and care should be taken to see whether the wheels track or not, as the rear axle unit is an infirmity of many a low-priced shaft-driven car. After a season's use many of them are hopelessly out of true, wasting a large percentage of the power and wearing the tires unevenly, and while the repair required may not be an expensive one, making a good job of it is apt to be so, as the trouble is the result of inherent weakness that is bound to crop out again. It goes without saying, of course, that when the purchase of a used car is in question, only one of a well-known standard make should be considered. Many old cars find their way into the second-hand market for no other reasons than the fact that their owners have purchased others of a later model, but there is also an eternal crop of failures that end up in the same place. They were hopeless at the outset, and no amount of tinkering can better them; they should be avoided as the plague, and particularly because they are frequently offered as "brand new, never run," which, of course, is a fact, but one that should put the buyer on his guard.

In no other field does the ancient maxim of law *caveat emptor* apply with greater force. Let the buyer beware! If the seller gives an absolute warranty that the machine is in a certain condition of fitness, he may be held responsible, but sellers are wise individuals, and much of what the average buyer construes as a warranty is nothing more than mere puffery—the seller's inflated opinion of his own merchandise—and is so considered by the courts. It is just as well to disregard the seller's laudation of his wares *in toto*; the car itself will tell its own story to the experienced eye, and the intending autoist who knows little or nothing about automobiles will find this a roundabout way of saving money unless he goes accompanied by some one who

knows the ins and outs, and is not retained by the other side to sell a car.

#### Some of the Would-be Buyers' "Don'ts."

Of course there is a whole category of *don'ts* for the man about to purchase an automobile, whether it be new or otherwise, but, like most admonitions, they do not carry a great deal of weight as a rule. There are a few of them, however, that may well be borne in mind, and the first is not to be misled by the appearance of a car. Refinishing its exterior is a far less expensive and far less important item than providing it with new mechanism or other essentials. The car with the shabby appearance gained in a season's legitimate wear is apt to prove far better than the creak of ancient vintage that has been rehabilitated to look like new. Some people are so gullible that a second-hand dealer could sell them a good looking car without any *works* in it at all. It seems to be impossible to avoid referring to the man who makes a living at selling cars that have been discarded by their original owners in discussing the matter of buying such a vehicle, and while on the subject for the moment it may be as well to cite an instance or two of his knavery—only the unembellished facts being given in each case.

For ways that are dark and tricks that are vain, some second-hand automobile dealers have Bret Harte's heathen Chinese "*faded*," to use an expressive bit of vernacular. If the car had existed in the days of the when-is-a-thing-not-a-thing conundrum, the answer to when is an automobile not an automobile? would have been when a second-hand dealer has it for sale. Take instance number one—the misleading for-sale ad. in a daily paper furnished the *come-on* as usual and under the blandishments of the salesman the purchaser became the happy possessor of a car that was guaranteed to be the 30-horsepower model of a well-known maker who failed only a year or so before; in absolutely first-class condition, and good for 30 miles an hour anywhere on the level. The dealer simply hated to take the money for it, so good was the car, but under compulsion was willing to accept about six to eight times what it was worth. The next day the newly-made autoist invited his friends for a ride in his new acquisition, and after getting fifteen miles out at the rate of something nearer three than thirty miles an hour, paid his friends' carfare home and a truckman to tow the car back. Within twenty-four hours later the deluded buyer had found out what any well-informed autoist could have told him before he had been trapped. The car was a model of some four years previous, and had never been anything but a failure. It had a 40-horsepower body and chassis and a 10-horsepower motor to pull it.

The second case was considerably worse, in that the buyer was a trained machinist, unfamiliar, however, with automobiles. The car was one of the best known of French makes, selling at a high price when new. It was offered at a fraction of its original cost, and guaranteed as having only been run a few thousand miles and as being the model of the year previous. To make a long story short, the car was three years old, and had been abused so that there was scarcely a perfectly sound part in it—which the new owner found out from its original possessor a short time *after* he had parted with his money for it. An electric that was sold as being but a year old and good for thirty miles on a charge, and in good condition, proved to be three years old likewise, with single tube tires that could not be made to hold air, and not good for more than six miles a charge at the most.

#### The Other Side of the Question.

Instances like the foregoing could be multiplied indefinitely, but there is no necessity for it. They are not cited to discourage the intending buyer of a used car, but simply to put him on his guard, for there is a totally different side to the question, and with the exercise of due care and discretion, considerable money can be saved by investing in a used car. The number of cars of well-known makes that are discarded simply because their owners have become the possessors of others of higher power or later model is legion. A very large proportion of them have been carefully maintained, and even in the condition that they are

offered for sale are capable of immediate running and good service for some time to come. The fact that it will invariably prove more expensive to maintain an old car than a new one must always be taken into consideration, and the question to decide before making the investment is whether the car is in such a condition that the expense of maintenance and repairs is going to prove such as to effectually wipe out any saving that may be made on its initial cost.

It must be remembered that on a used car of whatever make and regardless of its original quality or standing, there are always pieces that have seen their best days and will sooner or later need replacement. It depends upon how many things are just about on the point of giving out in a car that will decide whether it is a good investment at second-hand or not. The man who is fond of tinkering and has the facilities and time for the work will be able to take advantage of what would be considered little more than a wreck by the average buyer, who would be unable to get any service out of it except on the payment of an excessive outlay for repairs. Not many autoists are so situated, however, so that this is really an exceptional instance or class of buyer who need not be considered in this category at all.

Figure up as closely as possible what these repairs and replacements are going to cost, and as a much needed factor of safety in such calculations multiply by two. The result should be added to the selling price of the car before its availability is considered. Naturally the seller will be quite positive that either no repairs whatever are needed, or that the car can be *thoroughly overhauled* for a nominal sum, say \$25 or so. Let these things go in one ear and out the other as fast as they will travel, and don't take any stock in the thorough overhauling that is promised. It has been italicised here because it may mean anything from rubbing the outside of the motor off with a piece of waste to cleaning the spark plugs.

To properly overhaul a motor it must be dismantled; transmission ditto, rear-axle unit, steering and running gear likewise; when all these parts have been taken down, carefully inspected after cleaning, due replacements made and carefully adjusted and reassembled, a car can be said to have been overhauled, but it is the better part of a week's job for two good men, or at least one good man and a helper. Not one repair shop in ten would go to this extent in fixing up a car when merely directed to give it a thorough overhauling—it was done earlier in the game, but the customer usually howled long and loud at the size of the bill, so that now such things are only done to special order. It is easy to see that such a job cannot be done for a nominal sum. The thorough overhauling that can be done for a few dollars consists in cleaning things up generally from the *outside*, taking a look at the valves, timer and carburetor and seeing that the motor will run of its own accord for more than five minutes at a time. The size of the repair bill in a case where a genuine thorough overhauling is undertaken depends not alone on the number of hours put in by the two good men, at 60 or 70 cents an hour—and to the man who has to foot the bill they move exasperatingly slow—but also on the replacements that will be needed. Just what these consist of cannot be told until the motor is all in pieces and the condition of its parts is ascertained. New babbitt bearings may have to be poured or new bronzes fitted, new piston rings fitted, new valves, new valve springs, and what not else in the shape of small parts, as well as that of other replacements needed—they all add surprisingly to the bill, but with a fairly good car their cost should be covered by the calculation already referred to.

Given a car of reputable make to begin with and one that has not been unduly abused or that is so old as to have passed the limit of economic usefulness, there is no reason why it should not prove a good investment at second-hand. The buyer must make up his mind to spend at least 10 to 15 per cent. of the purchase price in putting the car in good shape, and unless the car is to be had at a very low price, this appropriation should not include more than one new tire, though it should cover retreading and spare inner tubes.



## LETTERS INTERESTING AND INSTRUCTIVE

### A Peculiar Case of Smoking and a Remedy Therefor.

Editor THE AUTOMOBILE:

[736.]—Will you please give me some information on the following:

I have a two-cylinder Reo car which makes a great deal of smoke when climbing a grade with the throttle almost wide open, but in traveling level road and when standing it makes no smoke. But when speeding up the motor and then throwing in the gear, it makes entirely too much smoke. Can you suggest a remedy?

Also, my engine misses quite frequently since I had one of the carbureters off to repair a leak. The missing occurs in the cylinder on which I removed the carbureter, but I did not move the adjustment of the carbureter at all. And when on the road it misses oftener with open throttle than otherwise and sometimes will slow down on opening the throttle instead of picking up speed. I discovered that both my carbureters will leak when engine is stopped if the valve under tank is not closed, but when engine is started it stops leaking. Would there be danger of it getting too rich a mixture on that account?

O. J. WORKMAN.

Aukentown, O.

It would appear that under the conditions first mentioned as the cause of the production of smoke, that the latter comes from the fact that when mounting a grade all the lubricating oil in the crankcase of such an engine runs back into the rear cylinder and burns as long as the car remains in that position, as the rear cylinder will always have an excess supply of oil under such circumstances—or the forward cylinder when things are reversed by going down hill. This would account for the fact that no smoke is produced either on a level road or when standing. Both the foregoing and the fact that it smokes when speeding up the motor would appear to point to an excess supply of oil in the crankcase, and the simplest remedy is to ascertain the proper level and maintain it. Probably the adjustment of the feed cups or oiler has jarred loose somewhat and permits considerable more oil to enter the crankcase than was formerly the case.

Failure of the motor to pick up when the throttle is opened, or actual slowing down under such circumstances, usually point to defective air regulation. It is sometimes the case that when the throttle is opened the auxiliary air-valve remains closed and the mixture becomes so rich that it will not burn, also causing more or less smoke. The fact that the carbureters drip gasoline when the motor is stopped indicates that the float level is too high; the only reason the leak ceases when the engine is running is due to the fact that the gasoline is then being used up faster than it can come through the nozzles. To remedy this the height of the float on its spindle should be altered slightly; the level of the liquid in the float-chamber should be such that it is just slightly below the orifice of the jet. Yes, this would tend to make the mixture too rich at all times, as the gasoline would flow without depending upon the suction of the engine to start it and may account for some of the smoke. See that there is no air leak when the carbureter that was removed is fastened to the cylinder.

### Explaining the Acetylene Explosion Mystery.

Editor THE AUTOMOBILE:

[737.]—Mystery of No. 636 is correctly explained by Mr. Covert, Number 703. Accident was caused by explosion of cuprous salt of acetylene,  $C_2H_2Cu_2O$ . It is a reddish-brown substance, insoluble in water, but decomposes by hydrochloric acid, with the evolution of acetylene. When dry it loses the molecules of water and becomes carbide of copper,  $C_2Cu$ , and when dry it explodes violently at  $120^\circ F.$ , or by friction (see Keyser, Remsen, Newth on Acetylene and Its Compounds). No doubt, if the editor of "The Automobile" would ask Dr. Keyser of Washington University, the authority on acetylene and its compounds, he would be glad to write an article, on either the prevention of the formation of this dangerous explosive in acetylene generators and tanks, or on its safe removal without injury to generating apparatus.

E. T. SENSENY, M.D.

St. Louis, Mo.

Your explanation of the mysterious explosion, set forth in letter No. 636, as well as that of Mr. Covert and others who have shed light on the matter, are of considerable general interest.

### Why Are Two-cylinder Vertical Motors Not Used?

Editor THE AUTOMOBILE:

[738.]—Will you kindly tell me through your columns why the two-cylinder upright motor with valves is not used in automobiles. I have seen two-cylinder upright motors without valves, but none with them.

BYRON PACKARD.

Newman, Cal.

To put your question in a slightly different form, it would be: Why are not vertical, two-cylinder, four-cycle motors more generally used? The chief reason is because such an engine is not as well-balanced as a four-cylinder engine, either mechanically or in its impulses. The two-cylinder vertical motors you refer to as being without valves are of the two-cycle type. It just so happens that you have only seen examples of the latter, though, as a matter of fact, there are far more of the four-cycle type in use. However, they are seldom used except for city work, and are coming into demand more and more for this purpose. Hundreds of the gasoline cabs now in service, and more than a thousand that are building or to be put on the market abroad within the next year or two, are equipped with two-cylinder vertical four-cycle engines. They are mainly of French design and construction where motors of this type have been very much favored for light work. In earlier days some of the best known American cars employed the two-cylinder motor, but now there are not many.

### Regarding Variable Inlet Valves and Steering Pivots.

Editor THE AUTOMOBILE:

[739.]—In your issue of April 4, "Angelos" inquires on page 587, "What American cars have variable inlet valves?" and you say you do not know of any American cars now on the market so fitted. Duryea vehicles have always been built with the variable lift valve, the valves being suction operated and prevented from lifting by the throttle slide. This arrangement insures the least possible action of the valve with consequent little hammering and noise. This saves destroying the valve and makes them very long lived. I have always used very light valves. A 1 1/4-inch valve weighs but 3 ounces and is closed by a spring that when the valve is closed has a strength of 8 ounces, and when the valve is opened a strength of 12 ounces. By careful adjusting of these valves each engine can be made to take a charge of such size that it will fire with the same strength as its neighbor, whereas a throttle at the carbureter may not permit such nice regulation. Further, the atmospheric pressure acts against the outside of the valve instead of against the outside of the throttle, some distance from the valve. This means that the engine will take fuller charges if throttled at the inlet valve than if throttled farther away. It is therefore quite essential for suction-operated valves that they also serve as throttles, and when so arranged speeds of 1,200 to 1,500 can be readily obtained, which is enough for long life. Doubtless "Angelos" will submit other reasons.

On the same page is an article on "cambering wheels" and you mention that steering is facilitated "by placing the point of support on the ground under where a prolongation of the steering pivot axis would strike." You do not mention, however, that the best way to get this result is to incline the steering pivot axis so that it strikes under the wheel instead of cambering the wheel so that it strikes under the axis.

CHARLES E. DURYEA.

Reading, Pa.

While for typographical purposes, the heading placed over the letter in question reads "Variable Inlet," the letter itself reads *variable lift*. Though we may be in error in the matter and are open to correction from those better informed on the subject, we have always construed *lift* to apply solely to a mechanically-operated valve, and took it that our inquirer had cars using mechanically-operated valves in mind when he asked the question. On that account we did not include the Duryea car in the category referred to, though had it been in mind at the moment mention would certainly have been made of its exclusive feature in this respect. As you are aware, the automatic type of inlet valve has all but disappeared from the automobile motor, and particularly from American cars, and has not been a usual feature of construction for two or three years past, so that it is not

at all strange that this type was overlooked in making the reply referred to. We are glad to call this exception to our inquirer's attention, particularly as he states therein that he is a strong advocate of the variable lift method of throttling.

We are also glad to call Joseph A. Kimber's attention to your further explanation with regard to the best method of inclining the steering pivot axis, so that it strikes under the wheel instead of cambering the wheel so that it strikes under the axis.

### Balancing a Three-Cylinder Air-Cooled Motor.

Editor THE AUTOMOBILE:

[740].—Being a close and greatly interested follower of the Letters Interesting and Instructive department of "The Automobile," I take this occasion to "butt in," and ask if you will kindly give me a little information.

A friend and myself are contemplating the building of a three-cylinder, 12-horsepower, air-cooled engine, of which we intend to buy the cylinders with the pistons and rings already fitted as well as the valves, also the crankshaft, and are having the aluminum crankcase cast. We realize that we can purchase practically the same engine in complete running order for less than it will cost to build it, but that is not the idea.

The stroke is to be 4 1/2 inches, giving a crank throw of 2 1/4 inches; the crankshaft with plain square web cranks set 120 degrees apart will be supported on four bearings. We are aware that such an engine is self-balancing as a whole, if each of the sections is of the same weight, but what we want to know is whether it will be necessary to attach counter weights to the "heels" of each crank to prevent any tendency toward an endwise "teeter." The engine is intended to be driven at speeds ranging anywhere from 200 to 2,000 r. p. m. You will confer a great favor by answering this question through your columns.

H. W. CYRUS.

Astoria, Ore.

Assuming that the weight of each moving unit—i.e., piston, piston pin and connecting rod—in each cylinder be equal, a three-cylinder engine with the cranks set at 120 degrees, such as your design calls for, has an almost perfect mechanical balance, and as in operation a compression stroke in one cylinder will always be opposed to the working stroke of one of the other cylinders, the impulses will also be balanced to a considerable extent. In such an engine it is not necessary to use counter weights on the ends of the crank webs, as is imperative in the case of the single-cylinder type. Nor is it necessary to employ this expedient on either two or four-cylinder vertical engines for automobile or marine use, although an occasional instance will be found.

### FUEL AND OTHER CALCULATIONS.

Editor THE AUTOMOBILE:

[741].—I am enclosing several calculations relating to gasoline vapor as a fuel in the internal combustion motor which I think may be of interest. The basis of these calculations is as follows:

Temperature of hydrogen..... 3,259° C.  
Temperature of carbon..... 2,458° C.

When burned in air, in accordance with Bunsen and others, therefore

H equals 3,259 times 9 divided by 5 plus 32 equals 5,898° F.

C equals 2,458 times 9 divided by 5 plus 32 equals 4,456° F. and  $C_2H_4$  equals gasoline equals 5,466° F. equals explosion temperature.

Constants used in these calculations.

Temperature of compressed volume equals 840° F.

Fall in temperature from the moment of explosion until piston descends on power stroke equals 5,466 divided by 3 times 2 equals 3,644° F.

Fall in temperature during power stroke equals 722° F.

Fall in temperature during the compression stroke equals 260° F.

Mean effective temperature equals M.E.T. equals 1,100° F. and 1,100 times 0.002 equals increase in pressure due to heat and M.E.P. equals M.E.T. times 0.002 times CP minus CP plus 14.7, and CP equals absolute compression pressure.

Example:

CP equals 80 times (1,100 times 0.002) equals 176.0 minus (CP plus 14.7) equals 81 equals M.E.P.

In accordance with heat and compression factors, but not including the most radical change that takes place, owing to the proportion that the diameter bears to the stroke. When the diameter is less than the stroke the formula is 175 minus (S minus D times 15) and 13,750 divided by 175 minus (S minus D times 15) equals M.E.P.

When the diameter is greater than the stroke, from a point at

which both the bore and stroke are taken as 3 inches and upward, the formula is: equals 13,750 divided by (175 plus (D minus S times 12)); the 175 minus or plus (S minus D times 5) or (D minus S times 2) equals volume per horsepower hour in cubic feet. But for motors in which the dimensions are less than 3D and 3S, the formula changes, owing to the small volumetric charge, as the efficiency is greatly affected by the overcharge of air and as the liquid fuel feed is so small that it can hardly be further controlled. As one volume of the liquid equals 1,740 volumes of the charge, the slightest change in the charge would mean 5 to 50 per cent. decrease in the M.E.P., and in these motors the formula would be: equals 5,466 minus (5,466 divided by 3) minus 612.00 equals M.E.T. and M.E.T. times 0.002 equals constant 2.42. However, small motors vary greatly, the same motor with the same fuel giving different results at different tests, the variation being from 5 to 50 per cent. The most effective motor I ever took a card from had a 6-inch bore by 4 1/2-inch stroke, and showed an M.E.P. of 87 pounds to the square inch.

In my opinion the two-cycle motor is the thing to use, and all these figures refer to it, as I do not consider the four-cycle a scientific production. Nevertheless, you cannot convince the manufacturer; he wants to show a lot of brass and iron for his money.

The following calculation illustrates a method of obtaining the correct volume of vapor from one volume of gasoline.

First calculation:

Gasoline equals  $C_2H_4$  at 0.67 specific gravity.

Water at 62° F. equals 62.321 pounds per cubic foot and 62.321 times 0.67 equals 41.756 pounds per cubic foot for gasoline.

Hydrogen equals 0.089523 grams per litre.

Carbon equals 1.07191 grams per litre.

H equals 0.0055912 pounds per cubic foot.

C equals 0.0669442 pounds per cubic foot.

C times 6 plus H times 14 divided by 20 equals 0.0239,971 pounds per cubic foot for gasoline vapor equals 0.024 pounds app. per cubic foot equals  $C_2H_4$  equals 0.024 pounds per cubic foot.

41.756 pounds divided by 0.024 equals 1,740 cubic feet of gasoline vapor from one cubic foot of gasoline, which equals 1,740 volumes of gas from one volume of gasoline and one pound divided by 0.024 equals 41.666 or 41 2/3 cubic feet of gas from one pound of gasoline.

Gasoline vapor requires for complete combustion from seven to nine volumes of air. Then 7 plus 9 divided by 2 equals 8 equals one volume of gas to 8 of air.

41 2/3 volumes gas times 8 equals 333.36 cubic feet of air equals total available volume per pound of the gasoline, and volume per horsepower hour equals V.P.H.P.H. and 333.36 divided by V.P.H. P.H. in cubic feet equals pounds of gasoline per horsepower hour consumed.

Calculations to ascertain the B. T. U.:

Formula equals 8,080C plus 34,462 H per Kg in degrees Centigrade.

C equals 6,610 and H equals 28,190 per pound in degrees Fahrenheit.

6,610 times 6 plus 28,190 times 14 divided by 20 equals 21,716 B.T.U. app. per pound of gasoline.

Value of gasoline as a fuel for explosion motors; gasoline at 20 cents per gallon; 7.48 gallons per cubic foot.

7.48 times 20 equals \$1.496 per cubic foot.

\$1.496 divided by 41.756 equals \$0.0358 or 3.58 cents per pound and 0.0358 divided by 333.36 equals \$0.0001075 per cubic foot or 10.75 cents per 1,000 cubic feet of gas, and if 173.7 cubic feet equals one horsepower hour, the cost per horsepower equals 173.7 times 0.0001075 equals \$0.01867 equals 1 cent 8 2/3 mills per horsepower hour.

Gasoline as compared with coal gas:

One pound gasoline vapor equals \$0.03583 equals 41 2/3 cubic feet of gas, then

0.03583 divided by 41.666 equals \$0.00086 per cubic foot of gas, or \$0.86 per 1,000 cubic feet of gas, and it is 25 per cent. less than coal gas, or as 8 is to 6. Then as

Coal gas equals 6 of air equals 6,000 and

Gasoline vapor equals 8 of air equals 8,000 and 2,000 plus air equals 25 per cent. or 0.0001075 times 6,000 equals 64.5 and 0.0001075 times 8,000 equals \$0.86 at \$1 per 1,000 for gas, and \$1 divided by 8 equals \$0.125 and \$1 divided by 6 equals 0.1667 and \$0.1667 minus 25 per cent. equals 0.125 or

Gasoline vapor and air, volume equals 8,000 cost \$0.86.

Coal, gas and air, volume equals 6,000 cost \$0.86.

Gasoline vapor and air volume of 6,000 cost \$0.645.

Gasoline as an economical fuel for test run.

48 divided by hours of run equals power consumed during run for a 25-pound limit, as

Run equals 4 hours and 48 divided by 4 equals 12 horsepower consumed in 4 hours from 25 pounds of gasoline.

48 equals (333.36 times 25 divided by 173.7 or x volume).

x volume equals volume per horsepower hour.

I consider this a just rating for gasoline. R. C. MATLACK.  
Chicago, Ill.



## A THREE-TON TRUCK FROM KANSAS CITY

**A**FTER a wide experience in all classes of pleasure vehicles, the concentration policy of the Kansas City Motor Car Company, of Kansas City, Mo., has led to the production of a three-ton truck only, a vehicle which benefits from the earlier diversified work of the firm and profits by its present equipment and well-selected international staff. The vehicle has been de-

signed with a full knowledge of the conditions under which the mechanical truck has to work, with the result that simplicity, accessibility and robustness form distinguishing features.

Carried forward on a Bethlehem chrome nickel steel frame, where it is in the most accessible position possible, is the power plant of the truck. The channel section frame is 168 inches long, 7 inches deep, 48 inches wide, narrowed to 36 inches at front to permit

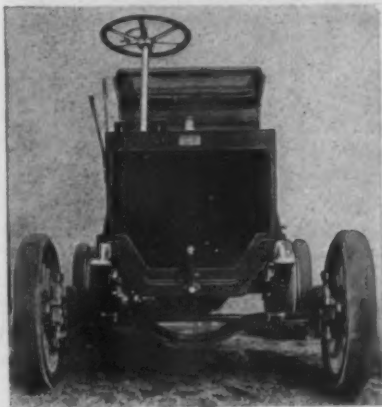
of big steering angle; it is reinforced by five cross members and large gusset plates riveted in pairs. Realizing the importance of a good suspension in the life of tires and engine, special steel springs, ten leaves 40 by 2 1-2 in front and 13 leaves 48 by 2 1-2 in the rear, are provided. The rear springs are double-shackled with extremely stiff distance rods, pivoted on sprocket shaft supports. The front axle is one-piece hammered-forged Krupp special steel, I-beam section, with Elliott-type steering yokes, with one H. B. ball thrust bearing; spring seats being integral. Steering knuckles are very heavy, hammer-forged with two large H. B. ball bearings on spindles. The rear axle also is one-piece hammer-forged Krupp steel, with integral spring seats, and H. B. ball bearings on each sprocket. The position of the motor forward leaves nearly the whole body of the truck avail-

able for the load, actual dimensions being 4 by 10 feet behind the driver's seat. Actual weight of the truck

is four thousand pounds, and full load capacity three tons. Wheelbase is one hundred and fourteen inches, track sixty-four inches and maximum speed is ten miles an hour.

A look through the big inspection plates in the frame forming driver's seat reveals a four-cylinder, four-cycle vertical motor with cylinders cast in pairs, mounted directly on the side frame. Valves are on opposite sides, each camshaft being machined out of the solid with cams integral; compression reliefs are provided for ease in starting. Very large water jackets, with 1 1-4-inch water connections, surround the cylinders; water circulation is assured by a large gear-driven centrifugal pump through a stiff tubular radiator equipped with a belt-driven aluminum fan.

Double ignition is provided by a high-tension magneto and battery and coil. There is fixed sparking point, spark being only retarded automatically when cranking the motor. Control is entirely by throttle lever on top of steering wheel, and by acceler-



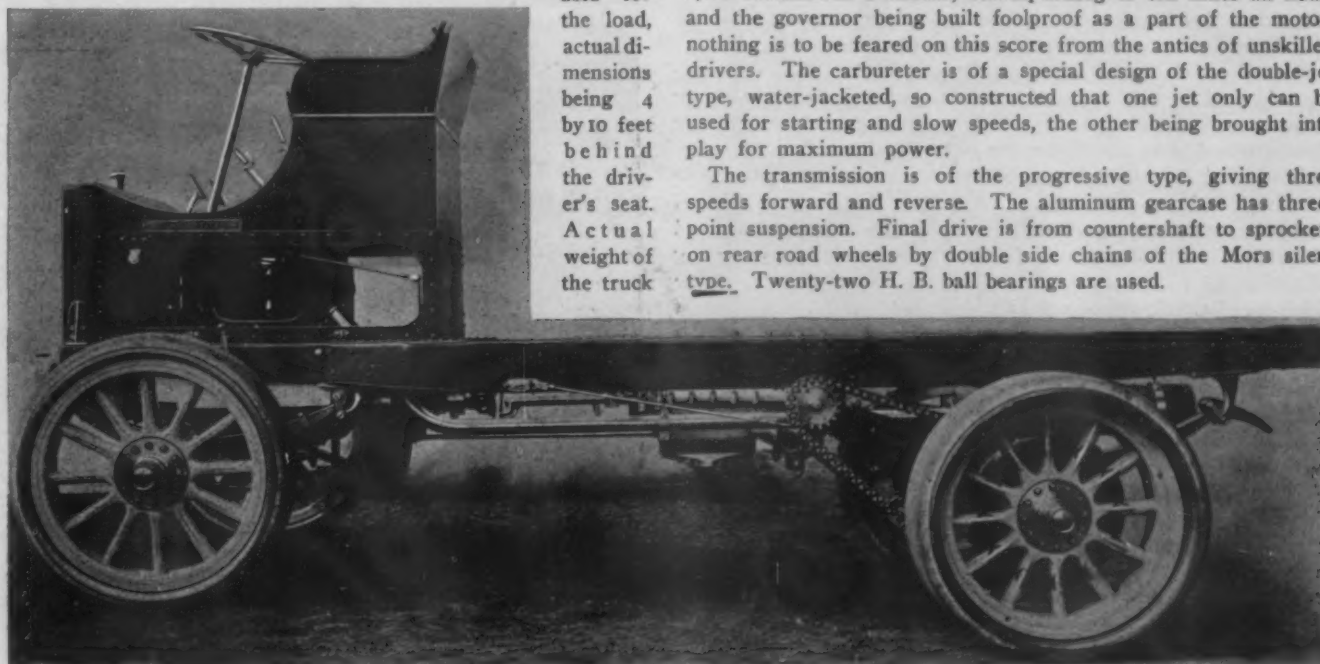
AS SEEN WHEN APPROACHING.



REAR VIEW SHOWING DRIVE AND KINDRED MECHANISM.

ator pedal for quick-speed regulation in heavy traffic. The speed of the motor being automatically regulated by the governor to 1,000 revolutions a minute, corresponding to ten miles an hour, and the governor being built foolproof as a part of the motor, nothing is to be feared on this score from the antics of unskilled drivers. The carburetor is of a special design of the double-jet type, water-jacketed, so constructed that one jet only can be used for starting and slow speeds, the other being brought into play for maximum power.

The transmission is of the progressive type, giving three speeds forward and reverse. The aluminum gearcase has three-point suspension. Final drive is from countershaft to sprockets on rear road wheels by double side chains of the Mors silent type. Twenty-two H. B. ball bearings are used.

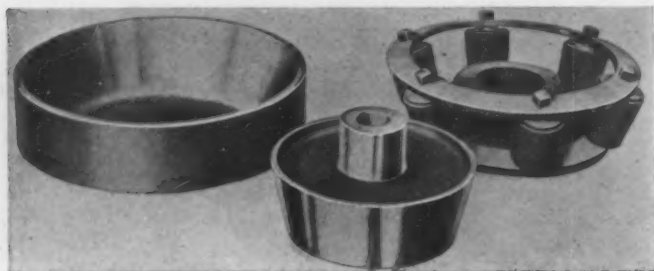


SIDE ELEVATION OF THE KANSAS CITY THREE-TON TRUCK, SHOWING LOCATION OF MOTOR.

## THE GEARLESS TRANSMISSION.

In perfecting the gearless transmission, the constructional details of which are illustrated and described herewith, it would appear that a long step toward the realization of the goal of many a designer—the gearless car—had been taken. Both the shortcomings of the present system in which, with few exceptions, gears are slid into mesh while in motion, as well as the reasons which have worked for its retention, are matters of too common knowledge to need recalling. "Simpler than a planetary, stronger than spur gears, more lasting than either," is a brief condensation of the maker's claims for the gearless transmission which consists of but three parts in all. These are a cup, a cone and a cage holding six rolls, the simplicity of these parts being evident at a glance from the illustrations. All are contained in a single housing, a view of which is shown. This comprises two-thirds of the entire change-speed gear, or rather device, as its chief feature is its lack of gears, in that with its aid, the low and reverse speeds are obtainable. The direct drive is obtained by means of a special clutch encased in a second housing, shown facing the first in the illustration referred to.

From the foregoing it will be noted that the gearless transmission bears considerable resemblance to the well-known planetary type, the similarity being very great so far as outward appearance is concerned, this being evident from the plan view of the chassis showing the complete gear in place, while the method of operation is actually the same. The remaining essen-



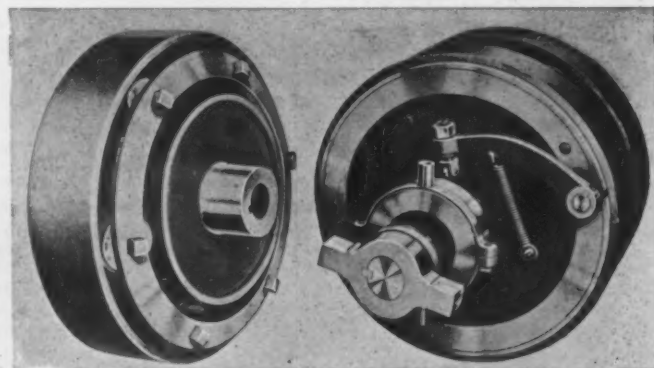
SIMPLE ESSENTIALS OF THE GEARLESS TRANSMISSION.

tial of this change-speed device consists of a crab-clutch splined upon the driving shaft and sliding thereon by means of a hand lever. As the forward end of the driven shaft is journaled in the hub of the driving cone, and the latter is permanently attached to the driving shaft, carrying the internal portion of the high-speed clutch, the external portion of the same is rotatable thereon, as is also the cup of the transmission. Thus the high-speed clutch is only connected with the driven shaft of the car when the crab-clutch is shifted so as to engage it, connecting it with the driving shaft from the motor.

The details of the working of the device can most readily be understood from a description of its operation rather than of its parts and their relations. To obtain the first or low-speed forward, the crab-clutch mentioned is shifted forward engaging the cage of rolls forming part of the external portion of the high-speed clutch, thereby connecting it with the driven shaft of the car. The cone keyed permanently to the motor shaft revolves the cage of rolls permanently fixed to the external member of the high-speed clutch by means of studs, in the same direction that it revolves, and as the cup of the transmission is held stationary by one of the brake bands operated by a foot pedal, it will be evident that the cage of rolls must roll around the interior face of the cup. This transmits the power to the driven shaft through the crab-clutch, which is splined on it. For the direct-drive or high-speed, pressing another pedal forces the cone forward, causing its tapering face to engage the roller on the end of the lever, raising the lever and opening the ring of the clutch against the inner side of the periphery of the housing.

From the foregoing it will be apparent that the crab-clutch mentioned is always in engagement with the cage of rolls for the forward speeds. In order to obtain the reverse speed, the side

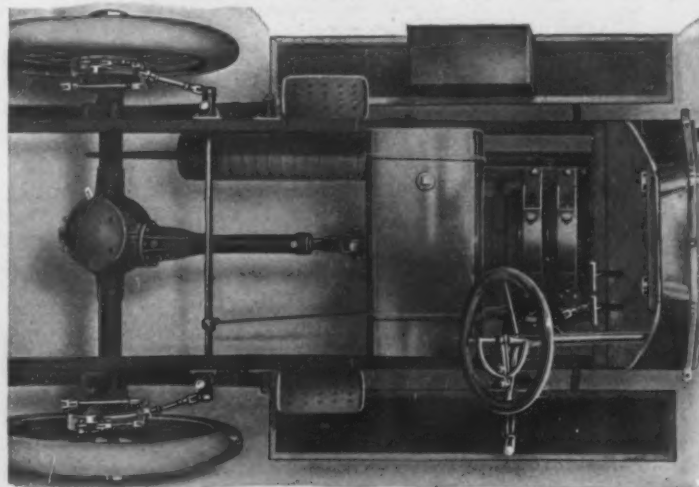
lever is called into play to slide this crab-clutch rearward, thus disengaging the external portion of the high-speed clutch from the driven shaft of the car and connecting therewith the external cup of the transmission. As the cone is permanently keyed to the motor shaft, it revolves continuously and thus turns the rolls,



THE TWO CLUTCHES READY TO MOUNT ON CAR.

thereby transmitting power from the cone to the cup through the medium of the rolls, which cause the cup and driving shaft to revolve in the opposite direction, thus giving the car a reverse motion.

The transmission is held in proper adjustment by means of a pressure bar located back of the cup, as shown in the plan view of the chassis, the required tension being maintained by springs exactly as employed in the familiar cone type of clutch. The cup is always in contact with the rolls at the required pressure. To start the car, it is only necessary to depress the pedal corresponding to the low-speed brake band, which compresses it around the cup of the transmission and gets the car under way. As soon as it is moving, this pedal is released and the other depressed, shifting the trunnion cone which operates the high-speed clutch. To shift from high to low-speed is even simpler, as it is merely necessary to depress the first pedal, again tightening the first brake band and automatically withdrawing the trunnion cone from engagement. The emergency brake is also interconnected with this cone and releases it when put on. There is a third pedal, which, when the car is running on either of the forward speeds, acts as a powerful transmission brake, as it compresses the band surrounding the high-speed clutch. The



PLAN VIEW OF CHASSIS SHOWING TRANSMISSION INSTALLED.

drum upon which it acts is 18 1/4 inches in diameter by 2 1/2 inches face, so that it provides a very powerful retarding agent. The gear ratio is 9 to 1 on the low-speed and 3 to 1 on the high-speed, this driving being alterable by changing the size of the pinions. The Gearless Transmission Company, Rochester, N. Y., are the makers.





It seems fitting that the builders of the Darracq cars whose experience has led them throughout the entire range of automobile construction from the single-cylinder car up to the eight and back again, as they are at present devoting attention to a one-lunger, should also specialize on a "six." This is a 50-horsepower shaft-driven car that attracted considerable attention when first uncovered at the Paris Salon last December, and is characterized throughout by features of design and methods of construction that have carried cars of this make to victory in more fields than one. The pressed steel frame forming the foundation of the chassis is of the type long characteristic of this car, all its members being of a deep-flattened "U" section in the model under consideration. There are four cross-stays, all of which are webbed at the corners to reinforce them. A sub-frame construction is employed and is carried on the first, second and third cross members. The side members of the main frame taper each way from the center, where they are six inches wide; they are turned in three inches at the dash in order to give an increased steering radius, and at the forward end of the rear springs they are given a four-inch camber in addition to being narrowed, this construction providing for additional spring play. The first cross member, which also acts as a radiator support, is carried low, so that the bottom of the radiator sets below the level of the main frame; it is placed just to the rear of the front axle. At the other end long S-shaped drop-forged dumb irons are employed to extend the spring length, besides carrying the body on lugs. The groundwork of the chassis is completed by the drip pan, extending from the radiator to the rear of the gear-box.

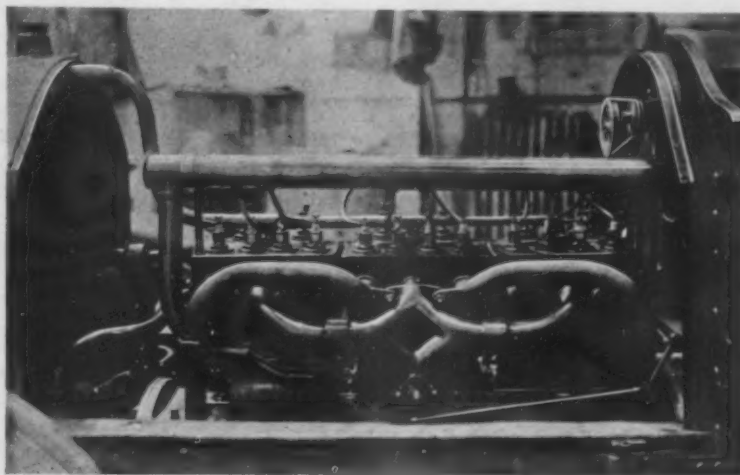
**Motor Design.**— The cylinders are cast in pairs and bolted to a comparatively shallow aluminum crankcase, provided with a large handhole opening on the right side. The base is divided into two parts, and a departure has been made in the method of fastening it to the sub-

frame by providing a continuous flange in place of the customary arms or lugs, thus making a much more solid form of construction with practically the same amount of metal. The cylinders measure 112 mm. bore by 120 mm. stroke, all the operating mechanism being placed on the left-hand side of the motor. All the valves are mechanically operated and interchangeable, and the single camshaft is utilized for driving the magneto and the gear pump, as well as operating the valves, while at the end it carries a bevel gear, driving a short vertical shaft carrying a Nieuport auxiliary timer on the dash, as well as the LeFevre mechanical oiler, by means of a Powco wire belt, the complete oiler being placed on the dash. The right-hand side of the motor is totally unencumbered except for the water-intake pipe and three oil feeds, thus permitting a free hand in working at the internal parts of the motor through the openings in this side of the base.

In an engine of the length necessary for six cylinders, it is quite a problem to so dispose the piping as to make it most convenient with the least length. In the case of the exhaust this has been accomplished by the use of two separate exhaust manifolds, each of which takes care of the exhaust from three cylinders, and is piped independently to the muffler, thus providing ample expansion space and rapid cooling. A short branch, made fast to the rear exhaust pipe, is led around the carburetor to provide a supply of hot air for the latter.

One of the most striking features of the motor design is to be found in the webbed construction crankshaft. As will be seen in the illustration showing this essential of the motor, the regulation type cranks or throws have been replaced by solid disks, each of which acts in the capacity of a small flywheel, thus tending to improve the balance of the motor. These disks are 15-16-inch thick and 7, 1-16 inches in diameter; there are nine of them in all.

The crankshaft is sup-



CARBURETOR SIDE DARRACQ "SIX" SHOWING INTAKE MANIFOLD.

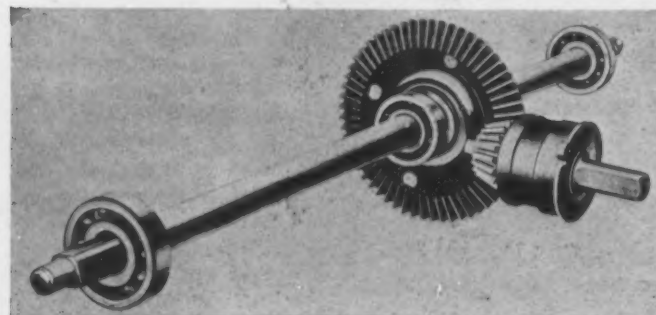


THE PECULIAR ONE-PIECE DISK CRANKSHAFT.

ported on two four-inch babbitted bearings at the ends and two three-inch bearings at the center, the latter being placed between the second and third, and fourth and fifth cylinders. The flanged connecting rods are provided with cups to scoop up the oil from the shallow crankcase, while runways are fitted to carry oil to the crankshaft bearings. The camshaft is in one piece with the cams integral, the cylinders firing in the order of 1-4-2-6-3-5. The flywheel is 15 inches in diameter and has a 5-inch face. Cooling is taken care of by a gilled tube radiator and gear-driven pump, supplemented by a fan.

**Carburetion.**—Quite in contrast with some of the cars that have been on the market as long as the Darracq, the carburetor is of the simplest type, consisting of a float-feed chamber and single nozzle with an auxiliary air inlet controlled by a helical spring. It is always adjusted at the factory to give the best results, and the success that has attended its use on the many cars of this make turned out shows that its factor of reliability is very high, and quite in keeping with its simplicity. The problem of designing an intake from the carburetor to the cylinders that would represent an approximately equal length of tube from the central point to each has been solved in an ingenious manner, as will be plain from the illustration picturing the valve side of the motor. Brass tubing of 1 3/4-inches diameter is used and is of uniform size throughout. The carburetor is centrally placed between the third and fourth cylinders, and the intake attachment to it is in the shape of the customary Y, which turns upon itself after rising a few inches, and is converted into an inverted Y, forming a diamond as shown. The upper Y communicates with the third and fourth cylinders, while the two branches which leave it on either side carry the fuel to the first and second on one hand, and the fifth and six cylinders on the other. With a six-cylinder engine, as the impulses overlap one another, the suction stroke of one-cylinder is not quite completed before that of another begins, which results in exerting a uniform suction on the nozzle.

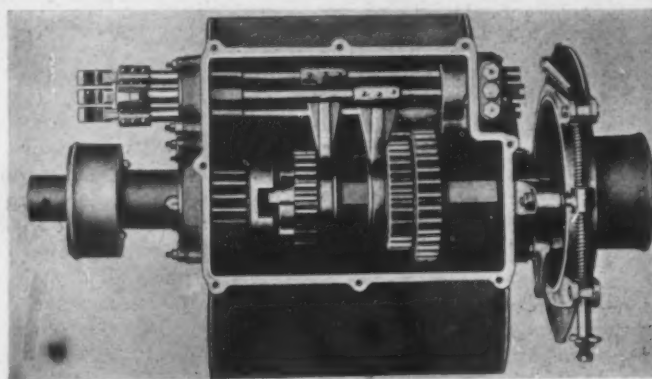
**Ignition Details.**—In accordance with current practice on high-grade cars where this essential of the motor is concerned, two independent systems of ignition are employed, both of them being of the high-tension type. One consists of a self-contained unit—a Simms-Bosch high-tension magneto, while the other is a synchronized system employing accumulators as the source of current supply. Though each system is complete in itself the wiring has been simplified and the amount of apparatus reduced to a minimum. The accumulator system consists of a single Nieupoort coil mounted on the dash, which also supports the combined timer and distributor driven by bevel gearing from the camshaft. The contact breaker cam is hexagonal and is mounted on the same shaft as the distributor, which has been made as simple as possible. The six terminals representing the plugs



THE REAR AXLE UNIT SHOWING GEARS AND BEARINGS.

from the cylinders are housed in a recessed vulcanite chamber, while a revolving disk of the same material carries the moving connection of the other side of the circuit. As there is very little necessity for advancing or retarding the spark when using the magneto system—and this, of course, is the constant-service system, the battery merely constituting a reserve—no ignition lever is fitted on the steering wheel. Instead, a small lever is carried forward from the magneto, ending in a ring near the starting crank in order to retard the time of firing to start; once under way, the lever is pushed back, and the car is run without altering the time of ignition. A ratchet lever and sector is placed on the dash for advancing and retarding the spark when the battery system is used.

**Transmission.**—The first step in this essential consists of the conventional type of leather-faced cone clutch, which, however, is not wanting in original features. It is entirely self-contained, both the flywheel and the aluminum cone being carried on the crankshaft of the motor, the retaining spring being housed between the two. To prevent the clutch from taking hold with a jerk in starting, four strips of clock spring-steel press against



CHANGE SPEED GEAR BOX SHOWING PEDAL BRAKE AND SPRAG.

the flywheel rim, and take the pull of the clutch until the latter is firmly engaged, permitting an easy start, even on the high gear. These strips are pressed outward by four small helical springs.

The changespeed gear box provides four speeds forward with the usual *marche arriere*, and is operated on the selective system, the hand lever being provided with a trigger which must be pressed in order to set the lever in the reverse position, the slot corresponding to the latter being fitted with a gate. The countershaft of the changespeed gear is placed beneath the main shaft, instead of parallel, and is idle on the direct drive.

**General Details.**—Two sets of brakes are fitted and the practice of making the running brake act on some part of the transmission system has been adhered to. This brake is pedal-operated, and consists of a drum placed on the propeller shaft just behind the gear box; it consists of a drum and metal band. Just behind it, on the same shaft, is a ratchet sprag operated by a small lever from the dash. The emergency brake is of the internal expanding type and is located on the driving wheels.

The steering gear is of the worm and segment type, supported on ball bearings, and the steering pillar is given just sufficient rake to place it in the most convenient position for the driver; the steering knuckle is a three-piece drop forging. Semi-elliptic springs are employed for the suspension, the forward pair directly under the frame measuring 37 inches in length, and have eight 1 3/4-inch leaves, while the rear pair is shackled outside the frame, and measure 45 1/2 inches, having nine leaves of the same width. The wheels measure 980 mm. by 120 mm.; they run on two-point ball bearings and are shod with the Michelin racing type of tires having a ridged tread. The gasoline tank, holding 17 gallons, is located under the front seat, and is of seamless brass, bolted directly to the frame. The wheelbase is 132 inches, tread 53 inches, and the clearance 11 1/2 inches. The gear box fitted gives the car speeds of 9, 17, 38 and 60 miles an hour.



## Continuing An AUTOMOBILE in OLD PROVENCE Around The ETANG de BERRE



"I HAD rather discover a new road across France than blaze a trail across 'Darkest Africa,'" said the chauffeur; and he was quite right. There's a wealth of novel experience to be had, besides no end of out-of-the-way information to be gathered, if one will only leave the beaten track and strike out for himself anew, not necessarily into a wild unpeopled region, but at any rate off the track of conventional travel. The byroads are not so "fast," as the automobilist puts it, as the high roads, but, like Prince Charlie, one often arrives before the others who stick to the well-worn roads. The shortest distance between two given points is often not by the "Routes Nationales," but by the *routes secondaires*, and even those of the third class, all of which are more than ordinarily good in France when judged by any other standard of road values.

There is a little outlying section of Provence, just off the great highway which runs from Paris to Antibes and known as the Route d'Italie, which Riviera tourists by road or rail know little of. Nîmes, Arles, and Avignon they know, and at times linger in beyond the hour and a half usually devoted to déjeuner, but the vast wind-swept tracts of the Crau and the Camargue, with their olive groves and cypresses and their flocks and herds and their little, sleepy, old-world towns, are a terra incognita to many who would revel in their delights if they only knew.

This, then, is a plea for that part of Provence known as the Bouches du Rhône. It has been shamefully neglected by winter birds of passage to the Riviera and the stale divertissements of Monte Carlo and the bridge parties and the tea-fights of Nice and Cannes.

Between Arles and Marseilles, then—after one has made that delightful excursion to the Gallic Pompeii, Les Baux—is a region full of quaint charm and novelty which the "personally conducted" know nothing of, and which must truly be seen to be appreciated.

Off at a tangent, southeast forty kilometers or a little more, from Arles, is Les Saintes Maries, the landing place in Gaul of the three Marys of Judea, who were "exiled in an open boat without sails or cordage," as the legend has it. The great fortress-

church of the little fishing village of "Les Saintes" is one of the wonder works of architectural art. Within is the shrine containing the relic of the Marys of Judea, and beneath in the crypt is the burial place of the gypsy Sara, their servant, and the *patronne reine* of all the gypsies and vagabonds in Christendom. Here, on the twenty-fourth of May of each year the nomads and *romany chieftains* from all parts of Europe gather to pay their devotions at the shrine of their sainted Sara.

At any time of the year it is a pilgrimage not to be neglected by any who pass by Arles. Go down and back between breakfast and lunch, or between lunch and dinner, or lunch at the Hotel de la Poste at "Les Saintes," if you will; but, anyway, you will have to pick up your wheel-tracks again back as far as Arles, as there is no other way of crossing the Rhône, and taking up your route again towards Marseilles.

Taking the road again from Arles, the route is due east for Salon, forty kilometers straight away over the stony Crau, with a road absolutely level for most of the distance.

### Highways Which Are Not of Yesterday.

Here's a good place to consider how and why these first roadways across southern Gaul were made: The Phocéans made the first great thoroughfares in Provence, the *via Héraclea* being the oldest of all which can be traced with certitude. It began in the south of Spain, and freeing the Pyrenees reached the Rhône, near Arles, where it branched out into three arms, one going north by Avignon, another easterly or northeasterly via St. Rémy, Cavaillon and Apt to the Alps, and the other striking across the Crau to the south of the Alpilles, the latter, probably, being the precursor of this very Arles-Salon road, continuing on to the Italian frontier over Les Maures and the Estérel.

The last portion alone—the southern route—is that actually traced by Hercules, but the nomenclature is generally given to the entire trunk-way. None of the villes formerly existing on this *via Héraclea* exist to-day, none dating in fact as settlements of magnitude, before the Roman era.

The Massaliotes reviewed and resurveyed this route and put up the progenitors of the modern mile-stones every eight *stades*, one of which may still be viewed in the Hotel de Ville at Salon.

For forty kilometers one crosses this strange nondescript land, the Crau, peopled only by an occasional lonely Mas or farmhouse and immense herds of sheep, goats and long-horned cattle and their guardians, a sort of a cross between a cowboy of the far West and a Swiss shepherd.

Mostly this vast, vague land, and its neighbor, the Camargue, the other side of the Rhône, is nothing but a grazing-ground, however. The cattle are chiefly a race of Spanish-crossed bovines, the bulls of which are frequently driven wild into town and put through their paces in the old arenas of Arles and Nîmes, or even in an improvised Plaza in the smaller towns, such as St. Rémy or Salon. It is commonly thought that bull-fighting is not a French institution, but be that as it may, there is no question but that it is as much the Provençal's pleasure as it is the Spaniards'.

Salon, the center of the olive and olive-oil trade of France, is an ancient bourg and a modern one; it has a fine old city gate, an ideal old battlemented château, and other relics of days gone by, and it also has cafés that would do justice to Paris, two or more exceedingly up-to-date hotels, and a typewriter agency (American, of course). The Grand Hotel at Salon is an efficient establishment which has a "good-enough" garage, and which caters for the inner man bountifully and excellently, if in somewhat a reminiscent fashion of a *grande ville*.

From Salon to the shores of the Etang de Berre, a great landlocked inland sea, is not more than a dozen kilometers, and one should first make for St. Chamas, there to visit the Pont Flavien, one of the world's bridge-building wonders. The road can easily be missed coming out from Salon, and if you are not careful you will bring up in the ugly, disgusting, little railway junction of Miramas, instead of St. Chamas, which you will not want to do at all if you have the true automobile spirit.

We went first to St. Chamas avowedly for the purpose of seeing the Pont Flavian, which our remnants of memorized history told us existed. We wanted to see it because we wanted to drive our automobile over a Roman bridge, whose foundations were first laid in the reign of the conquering Augustus. One meets with a genuine surprise when he first comes upon the Pont Flavian. It spans the rocky bed of the Touloubre and remains to-day one of the finest of those Roman monuments which were scattered up and down Gaul in the days of the Western Empire.

Skirting the western shore of the Etang de Berre, one arrives, in another dozen or fifteen kilometers, at Istres, a veritable Italian hill-town in France, as quaint and picturesque as anything to be seen in Piedmont. To eat and sleep, one must keep on as far again, when he will find the Père Chabas at Martigues' Grand Hotel ready and waiting for him.

#### Something of Interest to the Epicure.

One comes to Martigues' for two things, because it is known to the French as the Provençal Venice, and because of Chabas and his *bouillabaise*, the famous plat of Provence, but cooked nowhere with the quintessence of delicacy and aroma as by le Père Chabas, as he is affectionately designated.

As we drew up before Chabas' ever-open welcoming door, a perfume and an incense floated out which brought again to mind

dress of Arles—and runs the finances. As she puts it herself: "Paul he makes the bouillabaise and I keep the purse-strings; otherwise we should be as poor as a Martigaux." (Chabas comes from Cavaillon—the home of all good cooks, and Madame—being an Arlésienne—can afford to talk this way.) From this you may judge what a "good sort" Chabas really is. He knows how to cook baked beans, too, and makes a wonderful concoction which he calls an "*omelette Américaine*," which is nothing at all American, but the most glorious *omelette au rhum* you ever ate, or are ever likely to eat.

#### Where Modern Industrialism Jostles Antiquity.

Four kilometers from Martigues, at the outer end of the Canal de Caronte, and at the very edge of the surging, shimmering Mediterranean waves, is Port de Bouc, with a great shipbuilding works and a population which is as Italian as it is French, and in some respects more picturesque.

St. Mitre is six or eight kilometers to the westward, and is an old Saracen hill-town, once a stronghold of renown, as its old ruined walls and gates still show. Fos-sur-Mer, hardly known except to antiquarians, is between St. Mitre and the sea, and is the ancient Roman Civitas Marius, a poor, wind-worn relic to-day of a power long since dead and buried. The old walls, or such as remain, are as lively a representation as one may find of a



THE ROADS OF THE BOUCHES DU RHONE.

the days when three American artist folk put in one long, bright winter here and ate *bouillabaise* once a day for a hundred days on end, and didn't get tired of it either. We also ate langouste—as much of an improvement over the lobster as the lobster is an improvement over a crab—and oysters, and even mussels—which no one in America ever thinks of eating, though here we thought them an excellent dish.

There may be many good and sufficient reasons why all automobile tourists cannot find the time to explore all the highways and byways of Provence that he would like, but there is absolutely no excuse for giving Martigues and Chabas, and his *bouillabaise* the go-by. To do so would be doing one's self an injustice, since the route via Martigues, from Arles to Marseilles, is as good a road, and but a trifle, if any, longer than that which is known as "la grande route."

Martigues is known of all Provençaux, by some Frenchmen, and by a few—a very few—outsiders, mostly artists and Americans at that; seldom if ever an Englishman. There are no tea-shops! Martigues is Venice without the palaces and history; its quais and canals are every whit as picturesque as the Guadecca, and nowhere along Mediterranean shores are to be seen so wonderful a collection of those queer lateen-rigged, *tartanes*, *balancelles*, *bêtes* and *catalans* as here. And then there is Chabas again with his cookery which can't be beat by anyone, and equaled by but few. Nothing in the Palace Hotels of Cannes, Nice or Monte Carlo can offer the zest of the cuisine *chez Chabas*, and for that reason the memory of these eulogistic lines should not be put away in a foggy corner of the mind. It's all very crude and rough and ready; all but the welcome of Chabas and his Arlésienne wife, who wears always the picturesque head-

mediaeval walled town, the general outlines being reminiscent of Carcassonne in the Pyrenees, the finest walled relic of its class to be met throughout the length and breadth of France.

Leaving Martigues behind, and heading east towards Marseilles via Carry, Saussay and Estaque, another new world is opened up for the automobilist who has just come down from the sterner north. There are forty-eight kilometers of superb up and down and twisting, turning road from Martigues to Marseilles by this route, mostly by the very fringe of the great, tideless Mediterranean. The background panorama rising off to the eastward of Marseilles is as brilliant and fairylike as anything on the Riviera itself, besides which there is a touch of actuality lent by the smoke of many factory chimneys and the steamships in the harbor, with the prominent accented notes of Notre Dame de la Garde and the Chateau d'If ever in the foreground.

The other route from Martigues to Marseilles still skirts the shores of the Etang de Berre to Marignane, where one should stop long enough to visit the Hotel de Ville, the ancient family chateau of the Mirabeaux. A half a dozen kilometers farther on is Les Pennes, a curiously perched and ravishingly quaint hillside town, with a population of less than a thousand, all living along one main street, and having no occupation in life but to remark on the weather and dance the Farandole and drink their aperitives twice a day on the café terrace of the tree-bordered *place*, where all through the winter the "*cheminée du Roi et de la Reine*"—the brilliant southern sun—gives all the heat necessary for comfort. Where the money comes from to keep all this population alive is a question—probably from pensions.

Just beyond Les Pennes is the Côte d'Assassins, an ominously named three kilometers of bad road surface, and as steep a climb



as one will find on any main road in France. The hill climbs up to the crest of the Estaque range and drops down with a much gentler slope on the other to Marseilles without more ado. Its nomenclature is ascribed to two causes; that murderous highwaymen preyed their pestiferous calling here in days past with great regularity—and do to-day less frequently; and that to-day, as ever in the past, a wagon or an automobile gets out of hand and dashes down one side or another of the murderous hill to the death of the occupants, or any who may be in the path. Both explanations are plausible. It's a dangerous hill, either up or down, and the traffic over it is enormous in quantity.

#### Something About Bustling Marseilles.

The coast down the Mediterranean side to St. Antoine, the first tramway suburb of Marseilles, and so on for another ten kilometers to Marseilles' famous Cannebière, is a continual heart-in-the-throat procedure. One must travel slowly or take the consequences, which are as likely to be as direful for the occupants of the automobile as for outsiders. If you are Riviera bound, branch off the main road just before the Côte d'Assassins and go east via Aix, leaving your machine *en garage* at Aix, and go into Marseilles by electric car



MARTIGUES, THE PROVENÇAL VENICE.

in an hour. You will save the need of a big insurance premium by so doing, also the possible chance of killing yourself.

The last ten kilometers after the crest of the Estaque is simply awful (as indeed are all the roads in and out of Marseilles). There are great, long, tandem-drawn trucks and drays without number, often with five horses in line. There are two lines of tramway all the way, and a bad lot of badly worn pavé as well; besides which there is the Bureau d'Octroi, placed in a most convenient spot, where per-

force you must stop and convince the officials that you are not smuggling in a jugged hare or a can of French peas, and thereby defrauding the municipal coffers of some sous.

Marseilles' hotels are of all sorts. The great hotels, like the Louvre et de la Paix or the Grand Hotel Noailles, are big, expensive establishments, excellently appointed and excellently well-kept, but the same sort of thing you will find in Paris with prices about the same. The Hotel de Russie et d'Angleterre is more modest in fit-up and price, and has garage accommodation for three automobiles.

The best thing in the hotel line at Marseilles, for the automobilist or other traveler, is the Hotel du Touring, on the Cours Belzunce, with "*chambres hygiéniques*," and, what's more, hot and cold water in every room and electric light, a combination that is rare in France, or indeed in Europe. It supplies rooms only, and there are no accommodations for automobiles. Its prices are very moderate, and the inconvenience of going outside for your food is one of the pleasures of coming to Marseilles anyway; its restaurants are apparently more numerous, excellent, varied and modest in price than in any other city on the globe.

For garage accommodation one should go to l'Archevêques or the DeDion Agency, Masse



AT CHATEAU NEUF.



THE WALLED TOWN OF LES PENNES.

et Cie., each nearby. It will cost two francs a night for storing your automobile, but land values are dear in Marseilles, and if you want any repairs afterward, such as a new thread or a bolt, probably a franc will cover

it. The garage proprietors of Marseilles are not robbers, simply good business men. The days of the overcharging garages are drawing to a close, and one finds more often than not places where the prices are fair and the work mainly satisfactory.

Marseilles, also, is big enough to offer a wide choice.

#### ROYALTY AT FIRST MADRID AUTO SHOW.

MADRID, May 4.—King Alfonso presided at the inauguration of the first Madrid automobile show to-day in the Palace of Industries and Fine Arts. His Majesty, who was accompanied by the Queen Dowager and other members of the royal family, was received by representatives of the municipality.

French firms take the lion's share of the exhibition space. Only the most important German firms have stands; Britain's representatives are but three in number and the Spanish industry is not able to claim a greater numerical value. Competitions will be held for the most artistically decorated stands and for the most elegant and comfortable bodies. During the two weeks that the show remains open garden parties, bull fights, banquets, balls and galas will be held daily.

#### GOLD CUP MANAGER LANDS IN EUROPE.

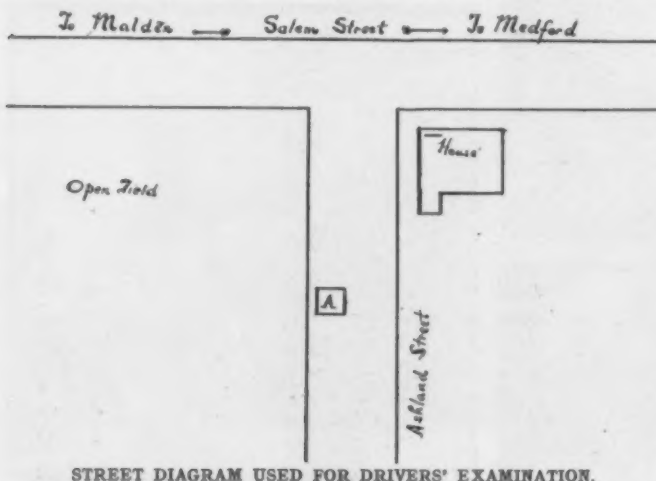
ANTWERP, April 25.—Among the passengers arriving on the Red Star liner "Vaderland" from New York to-day was Georges Dupuy, manager of the American Gold Cup tour. Mr. Dupuy has brought with him a 60-horsepower Stearns, on which he expects to start immediately for Paris. After a few days in the French capital engaging seats for the tourists who will visit the Grand Prix, securing hotel accommodation for the main party, etc., the Stearns will set out on its 6,000 miles run through Europe, covering the entire route to be traveled later by the caravan.

Emperor William and Prince Henry of Prussia, accompanied by several government officials and members of the I. A. C., toured recently over the Taunus course.

## TO EXAMINE THE PROFESSIONAL CHAUFFEURS

BOSTON, May 6.—The Massachusetts Highway Commission created consternation in the ranks of the professional chauffeurs last week when it announced that it proposed putting into operation a system of written and road tests for applicants for licenses to operate motor vehicles for hire. The present requirements for obtaining a professional chauffeur's license are very light, the applicant having to swear merely that he has driven a hundred miles or more. But even under these conditions the commission found that many applicants, mostly the product of "Automobile Schools," were perjuring themselves in order to obtain licenses, and that they were really unfit to drive. The Governor also recognized this state of affairs, and in his inaugural address recommended that a board of examiners for chauffeurs be established. The Legislature turned down the Governor's proposition, but it is expected that it will be willing to provide the necessary funds, \$3,000, which the Highway Commission wants to carry out its examination system.

Some weeks ago the commission directed its secretary, A. B. Fletcher, to make an investigation into the professional chauffeur



STREET DIAGRAM USED FOR DRIVERS' EXAMINATION.

situation, and, as a result of that direction, Mr. Fletcher drafted a system of tests, and has been experimenting upon applicants for licenses. The test is in two parts, one a written examination which counts for 50 per cent., and the other a road test which counts also 50 per cent. It is figured that a candidate who can pass the road test and make at least 15 per cent. on the written test should have a license. The secretary has examined recently forty-one applicants, and eleven of these failed to meet the requirements.

The road test that has been used in the experimental examinations consists of driving up and down hill in clear and crowded streets and turning corners, besides a demonstration of the applicant's familiarity with the machine. The applicant was required to provide the machine with which the examination was made.

If the Legislature provides the appropriation asked for, the Commission will at once put its system of examination into effect. It will probably appoint examiners in most of the principal cities of the State to conduct the examinations, so that applicants will not be obliged to come to Boston. The examination applies only to applicants for professional driver's license, the commission not deeming it necessary to subject applicants for private operators' licenses to such a test. The written examination form used by the commission is as follows:

**PART I.—(Written Examination.)**—The applicant will answer each of the following questions without assistance from any person and without consulting any book, note or paper of any kind. The answers may be as brief and concise as is consistent with the subject.

1. When, in operating a motor vehicle, another vehicle approaches you, on which side of the center of the traveled way should you pass the approaching vehicle?
2. When you desire to pass a vehicle going in the direction in which you are going, on which side of the center of the traveled way should you pass the other vehicle?
3. When approaching a horse-drawn vehicle or a horse upon which a person is riding, what do you understand is your duty under the laws of Massachusetts?
4. Mark on the diagram the path you should trace in going from Ashland street into Salem street, assuming that you wish to go to Medford. Indicate also the path you would take if you were going to Malden, assuming in each case that the automobile is to start at the point marked "A" on the diagram.
5. As you approach Salem street, describe in detail how you would operate the automobile and just what you would do.
6. Where, in accordance with the automobile law, should the operator's license and the certificate of registration be when a motor vehicle is being operated?
7. Where should the badge of a professional chauffeur be worn when he is operating?
8. Describe how the number plates should be placed on an automobile, and give the rules of the Massachusetts Highway Commission concerning them.
9. During what period should the lighted lamps be on an automobile under operation?
10. What special appliances and safeguards does the law require to be on every automobile?
11. What precautions is an operator required to observe on leaving an automobile in any street, road or public place?
12. What is the penalty for operating an automobile recklessly or while under the influence of intoxicating liquor?
13. When about to leave the garage, shop or place of business of a manufacturer or dealer in a car owned or controlled by a manufacturer or dealer, what is the duty of the operator?
14. What is the provision of the law concerning the attachment of number plates assigned to a motor vehicle to another vehicle to which they do not belong, and concerning the obscuring of the figures on number plates to conceal the identity of a motor vehicle?
15. Define "thickly settled or business part" of a city or town, as used in the automobile law.
16. What speed, under the automobile law, should never be exceeded by a motor vehicle?
17. In excess of what speed, outside of the thickly settled or business part of a city or town, is the rate of speed prima facie evidence of improper operation?
18. In excess of what speed, inside the thickly settled or business part of a city or town, is the rate of speed prima facie evidence of improper operation?
19. In excess of what speed on approaching a crossing of intersecting ways, in traversing a crossing of intersecting ways, or in going around a corner or curve in the highway where the operator's view of the road traffic is obstructed, is prima facie evidence of improper operation?

### GEORGIA WILL HAVE AN AUTO LAW.

ATLANTA, GA., May 4.—A bill will probably be introduced at the coming session of the legislature regarding automobiles. The proposed legislation is similar to what has been adopted in a number of other States. The law requiring the registration of owners of automobiles with the Secretary of State is the kind which is now wanted for Georgia. It also provides for registering the name of the owner and his chauffeur. Such a law as the present New York State statute would be considered generally satisfactory by the automobilists of Georgia.

### ILLINOIS AUTOMOBILE BILL MAY PASS.

SPRINGFIELD, ILL., May 6.—Indications are that the automobile bill prepared by the Illinois Automobile State Association will become a law. President Sidney S. Gorham has been doing some energetic work. Last week, when the bill was advanced to third reading in the House, Mr. Gorham incurred the wrath of the presiding officer by his persistent lobbying, he urging members to vote against amendments.



## AUTO APPRENTICESHIP FOR FRENCH ARMY OFFICERS

PARIS, May 1.—A course in automobile construction has been added to the curriculum of the Ecole Polytechnique, at Paris, the government school in which are trained the cadets for the artillery and engineering services of the French army. M. Darracq has loaned a chassis to be used for demonstration purposes in the school, and as a send off to the new branch of instruction invited the military cadets to visit the huge factory on the banks of the Seine, where are produced such varied types as single-cylinder runabouts and 200-horsepower racing monsters. Over a hundred "Pipos," as the polytechniciens are popularly termed, accepted the invitation and spent a couple of hours wandering through the works with M. Darracq and his most distinguished engineers as guides. Taximeter cabs, small runabouts, and powerful Darracq-Serpellet steamers have called for separate buildings, making the Darracq factory now the largest automobile works in France. Much interest was shown by the military cadets in the Darracq apprentice shop, in which 80 youths undergo a three or four years' training to fit them for positions in the works.

In our illustration the future army officers are shown around a six-cylinder chassis, the features of which have been explained to them by one of the engineers. M. Darracq is standing on the extreme left, Paul Ribeyrolles, chief designer, is in the center, and M. Vacherot, business director, is on the extreme right.

Although the French military authorities own but a small number of automobiles, a large quantity of material is put at their disposition through the operation of the conscription laws. In case of necessity the army can requisition thousands of automobiles now in private service and can call to the colors the pick of the mechanical world at a few hours' notice. Thus the method of making use of the automobile as an auxiliary of the army is entirely different to that of countries where military service is voluntary.

After two years active service in the army, every Frenchman must serve two periods of twenty-eight days each with the colors, followed by a couple of periods of thirteen days each, and is liable to be called on for active service in the army until the age of 45. Not only is he required personally, but his automobile, or any other vehicle he may possess, must be put at the disposition of the military authorities at certain intervals. When called upon to pass his twenty-eight days in the field, the reservist, if he is the happy owner of an automobile, takes his machine with him, is attached to the headquarters staff, and passes a much easier four weeks than if he had a knapsack slung on his back and a rifle over his shoulder. Occasionally a rich reservist will provide not only his machine, but a chauffeur in addition. Most of the cars used in the *grands manoeuvres* are supplied in this manner. Among the officers there are a certain number thoroughly versed in automobiling and capable of organizing an automobile corps to the best advantage from the diversified material placed at their disposition at all the

great mobilizations. The new course at the Ecole Polytechnique will tend to increase the number of such men, and even though they may not all become experts of the highest order, they will have a knowledge of the automobile in general and be better fitted to make use of this auxiliary in time of war.

Among the officers having paid special attention to the automobile for army purposes none is better known than Captain Genty, who figures in all the important French automobile races under the *nom de guerre* of De la Touloubre. Familiarly he is known as *tant que ça peut*, which may best be translated by "never give in." In the Ardennes and last Gordon Bennett on a Darracq, in the Grand Prix on a Bayard-Clément, De la Touloubre has shown himself a daring driver and skilled mechanic.

Only a few days ago an example was afforded of the part private automobiles would play in the army in case of mobilization, at the Vincennes garrison. Orders were given for all machines available for service in that district to be assembled at the old fort. Seventy automobiles of every possible type gathered

for the peaceful mobilization, among the drivers being such well-known automobilists as M. Dumont, the son-in-law of M. Clément, with a Bayard-Clément, Pawlowsky, the motor journalist, and Edmond, the Renault racing driver. Instead of the summary inspection to prove that the machines were capable of performing the service that the Government may demand of them, Captain Genty made a speech to his chauffeur reservists, telling them that it was his intention to put them to a practical test. "En avant," and the battalion of Pan-



EXPLAINING FEATURES OF DARRACQ "SIX" TO FRENCH MILITARY CADETS.

hards, Renaults, Brasiers and others was led into the hilly district in the neighborhood of the Marne. After four hours' traveling, including a grade of 18 per cent., which they were not all able to negotiate, the troop was led by its captain back to the garrison and dismissed from service.

There are probably about 250 machines belonging entirely to the army and in constant service. All of these are used for transport work and are all of special design to meet the requirements of the particular branch of the army in which they are used. The major portion are naturally designed for carrying ammunition and stores; a smaller number have tank bodies for the rapid transport of water, and a few are employed in the red-cross service. Delahaye, Peugeot, Dietrich, Gillet-Forest and Panhard are the firms having supplied most of the army vehicles. Drivers and mechanics for these machines are at hand in the young workmen who have left the automobile factory for a couple of years to wear the ill-fitting uniform that the patrie provides free. At the present moment Albert Clément is undergoing a three years' military training, and there are always hundreds of others, less conspicuous in the eyes of the public, but just as capable of handling a military automobile wagon as the dashing driver of the Bayard-Clément factory. Conscription provides the fast machines needed for officers' use.

## HEARD IN AND ABOUT THE CLUB ROOMS

### Quaker City to Attend Wilkes-Barre's Big Climb.

PHILADELPHIA, May 6.—Knocked about from pillar to post in its efforts to secure a suitable course for its Decoration Day hill climb, the Quaker City Motor Club, at its regular monthly meeting at the Majestic, decided to abandon the event entirely. While Monk's Hill, the course finally decided upon by the Contest Committee, had not been forbidden them, the glowing accounts of the fun in store for the Quakers if they would drop their climb and go up to Wilkes-Barre and contest for the prizes there, turned the balance in favor of the latter.

The new scheme had an ardent advocate in C. W. Matheson, president of the Matheson Company, who came all the way down from Wilkes-Barre and talked so glowingly about "keys of the city" and "nothing too good for you" that the vote in favor of the change was practically unanimous.

The Quaker City members will make a three-day outing of it, going up on the 29th and returning on the 31st. To insure some plunder for the Philadelphians, the Wilkes-Barre Automobile Club climb committee will add a couple of special events open only to them. Quite a few Quakers, however, will also enter the open events.

### Baltimore's Club to Have Touring Series.

BALTIMORE, May 6.—The first of the series of the H. M. Rowe touring contests, which are to be held under the auspices of the Automobile Club of Maryland, will take place June 7. The remaining two of the series will be held in September and October. The tour, which will be held in June, will be from this city to Hagerstown and return, a distance of 150 miles, while the next run will be over 200 miles, and the last run will be 400 miles. The contests will differ from the Glidden tours in that no professionalism will be allowed, and the owners will be compelled to drive their own cars. A handsome trophy will be awarded to the winner by Dr. H. M. Rowe, one of the automobile enthusiasts of this city.

Arrangements are being made by the local organization to entertain over 800 children on June 12, which has been set aside by the American Automobile Association as Orphans' Day. The children will be given a ride through the city and the Green Spring Valley, after which they will be entertained at luncheon. The automobiles necessary will be furnished by the Automobile Club of Maryland and the garages.

### Committee Chairmen for Wilkes-Barre Auto Club.

WILKES-BARRE, PA., May 6.—The Wilkes-Barre Automobile Club officers are busily engaged on the plans for the May 30 hill climb, the scene of which will be "Giant's Despair," up which a successful contest was run last year. President P. A. Meixell has named C. W. Matheson, W. E. Steelman, Laning Harvey and George Lee as a committee to decide upon the events and also complete arrangements with the Quaker City Motor Club, of Philadelphia, for the endurance run from that city to Wilkes-Barre. The regular committee chairmen named by President Meixell are as follows: Good roads, R. B. Vaughn; membership, W. F. Newberry; entertainment, E. W. Davis; club runs, P. A. Wright.

### Yale's Autoists to Have Another Meet.

NEW HAVEN, CONN., May 6.—The recently-organized Yale Auto Club will hold its second auto meet at the Branford Driving Park on the afternoon of May 11. The list of events includes motorcycle races, open and college races for touring cars and racers. Gold, silver and bronze medals will be awarded to the winners in the different events. Entries should be sent to W. P. Morden, 124 Wall street, New Haven.

### Buffalo Club Answers the Bison City's Mayor.

BUFFALO, N. Y., April 6.—The Automobile Club of Buffalo has answered the Mayor's criticism of the club's action in engaging a former Supreme Court justice to test the legality of the new vehicle ordinance requiring automobilists to pay an annual license of \$5 each. In its statement the club says:

"In view of the criticism of the Mayor, the Automobile Club of Buffalo desires to make its position clear with reference to the recent ordinance imposing a tax upon automobiles for the use of highways in the city. This ordinance was passed in total disregard of a general law of the State, which forbids any municipality enacting ordinances the effect of which is to exclude automobiles from the free use of highways. We purpose testing the validity of this ordinance in the courts. We have always assumed that it is one of the inalienable rights of a citizen, either individually or in conjunction with others affected in like manner, to ask for a judicial decision as to the validity of any law which may affect him either in person or property, and we cannot see how the exercise of that right is a fair subject for criticism.

"If this city can impose such a tax, then other municipalities may assume the right to tax automobiles for the privilege of passing over their highways, whether the owners be resident or non-resident, and the cumulative taxes thus imposed would become practically prohibitive of the enjoyment of our property. The ordinance imposes a tax of \$5 upon automobiles, while other vehicles are taxed \$1 or \$2. Such discrimination cannot be justified upon a fair comparison of the wearing effect on the pavements between automobiles and other vehicles."

A total of sixty-four applications for active membership were favorably received at last Saturday's meeting of the Automobile Club, bringing the total membership up to 711. With the exception of the Automobile Club of America, the Buffalo club is now the largest individual automobile club in the world. Of course, not all members live in Buffalo. However, local autoists appreciate the value of the club membership. During the past winter thirteen objectionable bills were brought up at Albany, but were defeated principally through the efforts of the Buffalo club.

### Exciting Election of Newark's Flourishing Club.

NEWARK, N. J., May 6.—The annual election of the New Jersey Automobile and Motor Club to-night was the most exciting affair in the history of the organization. If the Chancery Court decides that proxies are allowable, the following ticket was successful: President, Angus Sinclair; vice-president, L. T. Wiss; treasurer, J. C. Coleman; secretary, H. A. Bonnell; trustees, J. H. Wood, W. F. Kimber, W. C. Crosby.

With the 135 proxies cast and counted, Mr. Sinclair received 198 votes; Mr. Wiss, 203; Mr. Coleman, 207; Mr. Bonnell, 213; Mr. Wood, 201; Mr. Kimber, 197; Mr. Crosby, 198.

The independent nominees received the following votes: President, William C. Shanley, 97; vice-president, Frederick C. Pratt, 92; treasurer, William I. Fisk, 88; secretary, Leslie T. Ward, 82. Trustees: Charles W. Baker, 100; Edison Z. Seitz, 93; Dr. Frank B. Meeker, 96.

It is expected that there will be a quick decision from the Chancery Court on the constitutionality of voting proxies, the club being incorporated under the State law.

### Bridgeport Autoists Announce Their Hill Climb Program.

BRIDGEPORT, CONN., May 6.—Considerable interest is being displayed in the hill-climbing contest to be held at Sport Hill, Easton, on May 30, under the auspices of the Automobile Club of Bridgeport. The hill, which is one of the best known in Eastern Connecticut, and is five miles from Bridgeport, is about



one and a quarter miles in length, and has some steep grades.

The events have been arranged on the basis of selling price. Cars selling up to \$1,000 inclusive in class 1; up to \$2,000 inclusive in class 2; up to \$3,000 inclusive in class 3; over \$3,000 in class 4. Free for all, open to stripped touring cars and stock runabouts up to \$5,000, will compete in class 5. Entry fee is \$5. Elegant and valuable silver prizes will be awarded winners in all classes. A. L. Riker will be marshal, and the timing of the cars will be in charge of A. K. L. Watson and Archibald McNeil. Chairman Ralph M. Sperry, of the hill-climb committee, announces that all events are open, and autoists from all sections are invited to attend.

#### St. Paul Automobile Club to Have a House.

ST. PAUL, MINN., May 6.—A clubhouse and garage for the Automobile Club of St. Paul is assured and work upon a building, 75 by 138 feet and two stories high, will be begun at once. The building will be located on Fourth street, between Minnesota and Cedar streets, in the heart of the city. The definite announcement of the success of the clubhouse plans was made at a banquet given by the club at the Commercial Club last week. The building will be erected by Oscar L. Taylor for the club, and will have a garage on first floor and commodious rooms on the second. The membership of the club is now 125, and it is expected that it will reach 200 during the summer.

The banquet of the club was an enthusiastic affair, with representatives of the Minneapolis Automobile Club and other State association clubs in attendance. L. A. Wood acted as toastmaster and President Frank M. Joyce, of the Minneapolis club; Ambrose Tighe, president of the St. Paul Club; Judge Finehout, George H. Daggett, of Minneapolis, and others made addresses.

#### Annual Gates' Mill Climb of the Cleveland Club.

CLEVELAND, O., May 6.—Without doubt the hill climb of the Cleveland Automobile Club at Gates' Mill, east of Cleveland, this year will prove of greater interest than ever before. So many manufacturers and representatives of foreign cars are making inquiries regarding the event that it is likely to take on an aspect of international importance. In part the open challenge of F. B. Stearns against all comers is responsible for the attention that has been attracted toward this event. As yet the entry blanks have not been issued, but many inquiries have already been made for them.

The hill at Gates' Mill is being prepared for the test in the best manner possible. The only really dangerous curve has been banked and the course graveled and steam rolled. It will be in admirable shape in every way.

#### First Run of the City and Country Motor Club.

NEW YORK, May 6.—The first run of the City and Country Motor Club to the Lake Mahopac clubhouse was held yesterday, some twenty cars participating in the pleasure jaunt. On the return J. Stuart Blackton was the victim of a "holdup" in the village of Briarcliff, the rural Justice of the Peace giving the prisoner the choice of one of three penalties, the court announcing its decision in this manner: "Either loan me \$200, which you may call bail; stay in jail here until next week; or pay a fine." The victim decided to pay the \$30 fine, realizing that he was in the hands of the enemy.

#### The Cohoes Automobile Club, of Cohoes, N. Y.

COHOES, N. Y., May 6.—The Cohoes Automobile Club has been formed with a membership of 35 and the following officers: President, Dr. J. H. Mitchell; vice-president, J. Henry Williams; treasurer, F. J. Gardiner; secretary, E. R. Clifton. The club is a member of the New York State Automobile Association of the A. A. A. Meetings have been held at the garage of Kennedy & Son, but subsequently other quarters will be obtained.

## THE AUTOMOBILE CALENDAR. AMERICAN.

### Shows and Meetings.

- May 28-31.....—Indianapolis, Ind., Annual Meeting American Society of Mechanical Engineers.
- Oct. 31-Nov. 7...—New York City, Madison Square Garden, Eighth Annual Automobile Show, Association of Licensed Automobile Manufacturers.
- Nov. 30-Dec. 7...—Chicago, Coliseum and First Regt. Armory, Eighth Annual National Automobile Show and First Annual Commercial Vehicle Show, National Association of Automobile Manufacturers.

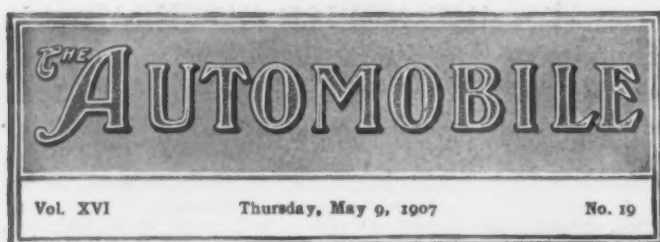
### Races, Hill-Climbs, etc.

- May 30.....—Wilkes-Barre, Pa., Second Annual Climb, "Giant's Despair," Wilkes-Barre Automobile Club.
- May 29-31.....—Philadelphia to Wilkes-Barre and Return. Endurance Run of the Quaker City Motor Club.
- May 30.....—Chicago, Memorial Day Race Meet of the Chicago Motor Club.
- May 30.....—New York City, Race Meet, Empire City Track, for Oldsmobile cars.
- May 30.....—Bridgeport, Conn., Hill Climb, Bridgeport Automobile Club.
- May 30-June 1...—Newark, N. J., Three-day Endurance Run of the New Jersey Automobile and Motor Club.
- June 12.....—National Orphans' Day, instituted by the American Automobile Association.
- June 19-22.....—New York City, Sealed Bonnet Contest, under the auspices of the Automobile Club of America.
- June 20.....—Albany, N. Y., Annual Tour of the Albany Automobile Club; Route, via New York and Asbury Park, to Atlantic City.
- June 27-28.....—Chicago, Elgin-Aurora Reliability Run, Chicago Motor Club and Chicago Automobile Trade Association.
- July 10.....—Cleveland, O., Start of Fourth Annual Tour of the American Automobile Association, for the Glidden Trophy. Finishes in New York City on or about July 23.
- Aug. 1.....—Algonquin, Ill., Hill Climb, Chicago Motor Club and Chicago Automobile Trade Association.
- Sept. 5.....—Chicago, Cedar Lake Economy Run, Chicago Motor Club and Chicago Automobile Trade Association.
- Sept. 14.....—Albany, N. Y., 95-mile Road Race, under the auspices of the Albany Automobile Club.

## FOREIGN.

### Races, Hill-Climbs, etc.

- May 15-31.....—Belgium, Industrial Vehicle Trials, Automobile Club du Nord.
- May 18-21.....—Milan, Italy, Touring Club Trials.
- May 22-25.....—Irish Automobile Club Reliability Trials.
- May 24-27.....—Voiturette Contest, Automobile Club of Austria.
- May 28.....—Isle of Man, Tourist Trophy Race, Automobile Club of Great Britain and Ireland.
- May 30.....—Isle of Man, Heavy Touring Car Race, Automobile Club of Great Britain and Ireland.
- June 3-12.....—Paris, Electric Vehicle Competition, Automobile Club of France.
- June 3-12.....—Herkomer Cup, Automobile Club of Bavaria.
- June 10.....—Pekin-Paris Automobile Tour, Start from Pekin, Inaugurated by "Le Matin."
- June 14.....—German Emperor's Cup, Taunus Circuit, Imperial Automobile Club.
- June 20-22.....—American Gold Cup, Start from New York of European Tour for American Cars, Georges Dupuy, secretary, 1402 Broadway, New York City.
- June 14-29.....—Scottish Reliability Trial, Scottish Automobile Club.
- July 2.....—Grand Prix, Automobile Club of France.
- July 14, 1908.....—Paris to London, Aerial Race.
- July 15-18.....—Ostend Week, Record Trials, Automobile Club of Belgium.
- July 21.....—Ardennes Circuit (Belgium).
- July 31.....—Liederkerke Cup for Touring Cars, Ardennes Circuit, Belgium.
- July 31-Aug. 8...—Belgium Regularity Contest for Touring Cars, A. C. of Belgium.
- Aug. 1-7.....—Criterium of France, 1,750 Miles Touring Competition and 250-mile Race for the Press Cup, A. C. of France.
- Aug. 11-29.....—France, Coupe de Auvergne.
- Sept. 1.....—Italy, Brescia Circuit, Florio Cup, A. C. of Italy.



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### Is There a Place for the Second-Hand Car?

In the early days of the great wave of popularity of the bicycle that swept over the land, models changed so quickly and so radically that the dealer looked askance at the purchaser who requested that his former mount be taken in trade. History repeated itself in the case of the automobile, and for the first three or four years the dealer confined himself to new cars, and most of the dealers would have preferred to see things remain thus. In fact, many of them set their faces resolutely against inaugurating the practice, but all to no purpose. Not that all have been compelled to adopt it, but circumstances proved too strong for many, while others have done so as a matter of policy. The time was not long in coming when the purchaser who invested in a new car every season held his order until he could dispose of his used car. This buyer represented a relatively large class, and it paid so well to cater to him that the dealers found it profitable to bid for him, and thus his car was taken off his hands, and the practice imperceptibly took hold.

Except for the fact that it necessitated larger quarters for the storage of such cars and the maintenance of a larger repair force, there appears to be no reason why there should have been any hesitation about adopting the practice, except on the part of the manufacturer, who considered it wholly out of his line. But how about the common garden variety of second-hand car and the second-hand dealer? A thousand and one reasons bring as many used cars into his hands; they are in all conditions and of all sorts, but in many cases much of the depreciation is fictitious. It is not actual mechanical depreciation, as measured by

the normal life of such a piece of machinery with reasonable care, and it is probably safe to say that a great many, if not a majority of the cars that find their way into the mart of the cast-offs, have a useful life of several years before them—again with reasonable care, of course, for abuse shortens mechanical as well as human life. Is there a place for such cars? The thousands of them that change hands ever year would appear to give an emphatic affirmative to the question.



**There Will Soon Be No More Worlds to Conquer.** When the automobile first distinguished itself by demonstrating its ability to cross the American Continent in record time, it was justly considered that here, indeed, was a conquest that would be hard to surpass. Since then the Continent has been crossed and recrossed, and, though the first attempts were considered something of a marvel in the shape of rapid travel under such trying conditions, the time has been cut in half. It is not too much to say that granted half the advantages possessed by the railway train in the shape of a solid roadbed with easy grades and curves, the automobile could make a cross-continental record, lowering the time of the best through mail trains.

Trips such as those referred to have become so tame by frequent repetition that enthusiastic believers in the capability of the auto have had to go further afield for something worthy of their mettle. Hence the Pekin-Paris propaganda, which is not merely a test of endurance, but a race. The daring nature of the project is such that no reward would appear sufficient to induce competitors to enter in such a trial, yet with no stake other than the glory of achievement, no less than fourteen cars have been shipped to the Far East with some of their drivers and the remainder have already left by rail. There is no reason to doubt that at least some of the competitors will succeed in traversing the 8,400 miles—much of which is an unknown wilderness—in what may be considered record time. Among the drivers there are some who have demonstrated their ability to take an automobile anywhere that four wheels can be made to run, so that it would seem as if the automobile would soon have no more worlds to conquer.



### The Automobile as an Aid to Fire Fighting.

With the present high factor of reliability that the past few years of improvement have brought it, the automobile stands second to nothing in its unification of all those qualities that go to make the fire-fighting machine par excellence. Its speed, ease of control, weight-carrying capacity and wide radius of action place it at once so far beyond any other known method of transporting fire apparatus to the scene of action as to render any comparison utterly out of the question. Numerous instances of its value in this rôle could be brought to bear. But a short time ago the services of three automobiles saved a Western town from total destruction; it was without adequate fire protection and half the town had already gone down before the fire, when the automobile saved the day. To do so, it had to cover twenty miles of rough road intervening between there and the nearest help. Other instances of an equally convincing nature are not wanting, and in all of them the rôle is played by the stock touring car.

How much more effective would the specially designed machine, not alone providing its own motive power, but also carrying its own fire-fighting apparatus, prove in such emergencies? The question is readily answered at home as well as abroad. Paris and other Continental cities have come to regard the automobile fire engine as a matter of course; it represents an innovation that was inaugurated two or three years ago in quite a few instances, and not alone its permanency in this rôle, but its eventual usurpation of it to the exclusion of the horse is looked forward to at no distant day. Progress has not been so rapid here, but the all-round capacity of the automobile for this work makes it only a matter of time when it will be the mainstay in serious fire-fighting the world over.



### LAYING OUT THE A. A. A. TOUR ROUTE.

On Tuesday morning last Dai H. Lewis, secretary of the Touring Board of the American Automobile Association, left Buffalo in a Pierce-Arrow six-cylinder to map out the course for this year's A. A. A. tour. He is accompanied by a photographer, and Chairman F. B. Hower, of the Touring Board, under whose direct supervision the work is being carried out, will be with him a part of the time. Distances are to be carefully measured, and all landmarks and turns in the road are to be noted. In the tour itself, the "Big Six" Pierce car will probably act in the same rôle as last year—that of picking up the checkers, it having been secured as the chairman's official chariot.

After due consideration, it has been decided to make the Hower trophy, which is now on exhibition at the Harrolds Motor Car Company's salesrooms at 1789 Broadway, an individual, instead of a club prize, to be won permanently by one entrant. The trophy is a four-foot bronze figure entitled the "Signal Man," who holds a torch above his head in one hand, a spear at rest in the other, while a fire burns at his feet. Its relation to automobiling is problematical, though there is no doubt as to its status as a work of art. A new set of rules, under which it is to be competed for, are now being compiled.

The most important announcement in connection with the tour made up to the present is to the effect that the tourists will go "a-Cooking" it this year, instead of having to rely upon the efforts of amateur advance men for proper hotel accommodations. It will be easier to do this, as nearly all the stops will be made in large cities. No stone is being left unturned by the committee, however, to insure satisfaction for all concerned. Work was undertaken several weeks ago, and the hotels will be obliged to sign contracts not to raise their rates in any way. A professional advance man engaged from Thomas Cook & Son's will precede the tourists and make all arrangements. He will carry a complete list of the occupants of each car and of the parties traveling together, and will inspect rooms and make all allotments, leaving his record for the checker-in at each point when he goes ahead. The checker-in will hand each arrival a card giving full information as to where cars are to be garaged, the name of the hotel, and the numbers of the rooms. It is thought that the services of an experienced professional should result in obtaining as nearly as possible the accommodation that each tourist desires. The advance man will keep in communication with the managers of the tour by telephone.

### FIRST ENTRY FOR VANDERBILT CUP RACE.

Although regulations for the next Vanderbilt Cup contest have not yet been issued, a car has already been entered for the great American automobile race. The early arrival is the 85-horsepower B. L. M. machine which was entered for the elimination trial last year, but was not completed in time to participate.

Announcement is made by the Royal Motor Car Company of their intention to construct two high-powered flyers for the Vanderbilt Cup race, and of the return of Robert Jardine to the racing game. The two machines will be strictly American, being built without the help of foreign designers, designs or materials. E. D. Shurmer, president of the company, expresses his confidence in their ability to make a creditable showing.

The three Thomas racers which have been under construction during the winter for the next Vanderbilt Cup race will be ready to turn over to their drivers for the preliminary tests by June 1 at the latest. They might have been put on the road by May 1, but positive orders were given some time ago that there should be no hurry in the assembling. However, with the picked men in charge and the experience they have had on racing cars, the work has progressed much faster than was expected. With the motors especial care has been taken; they are now on brake test and will be kept there for two weeks at the least, and will be given road practice after June 1.

### ASSOCIATED AUTOMOBILE CLUBS OF N. J.

TRENTON, N. J., May 6.—W. F. Sadler, Jr., is the new president of the Associated Automobile Clubs of New Jersey, and it is anticipated that the State organization of the A. A. A. will greatly increase in membership during his administration. With K. G. Roebing, Mr. Sadler organized the Mercer County Automobile Club, and these two were prominent in the fight against hostile

automobile legislation in 1905, their efforts being quite successful. In 1906 the Frelinghuysen bill occupied the center of the stage, and though it passed with features objected to by automobilists, there were several classes stricken out which have made the measure still more onerous. Upon the Trentonians devolved the burden of the work, but, of course, the backing of the State body was a factor in the effort to stem the tide of drastic lawmaking.



PRES. W. F. SADLER, JR.

J. E. Gill, another member of the Mercer County Automobile Club, is secretary and treasurer of the State organization, the

other directors of which are the following: Judge James B. Dill, Automobile Club of New Jersey; F. R. Pratt, J. F. Baker, New Jersey Automobile and Motor Club; W. G. Norwood, North Jersey Automobile Club; Walter E. Edge, Atlantic City Automobile Club; K. G. Roebing, Mercer County Automobile Club; W. N. G. Clark, Monmouth Automobile Club; Col. F. M. Barksdale, Automobile Club of Cape May; Dr. F. C. Ard, Union County Automobile Club.

### WISCONSIN'S A. A. A. STATE ASSOCIATION.

MILWAUKEE, Wis., May 6.—At the May 16 meeting the Wisconsin State Automobile Association will elect its officers. These are the probable selections for directors: Neal Brown, Wausau; C. O. Josslyn, Oshkosh; F. H. Blodgett, Janesville; Dr. L. F. Bennett, Beloit; W. G. Menzen, Fond du Lac; Judge W. S. Stroud, Portage; E. Roy McCanna, Burlington; Rich T. Robinson, Racine; C. A. Harper, Madison; A. R. Hoard, Fort Atkinson; Charles T. Jeffery, Kenosha; F. P. Hixon, La Crosse.

Three directors from the Milwaukee club will be named, and Secretary James T. Drought will undoubtedly be one of the directors selected.

The officers will be selected from among the directors, and it is probable that either Neal Brown, of Wausau, or C. O. Josslyn, of Oshkosh, will be selected president, while it is generally conceded that James T. Drought, of Milwaukee, will be offered the position of secretary.

### GEORGIA CERTAIN TO FORM A. A. A. BODY.

ATLANTA, GA., May 5.—A large and enthusiastic meeting of the Atlanta automobile owners and users was held at the Capital City garage to discuss the formation of a State automobile association. At the meeting no plans were made toward organization, as the backers of the movement first wished to see how the owners regarded the matter. It was clearly shown at the meeting that the majority of the local owners are very desirous to have a State body, and will heartily back any movement toward organizing one.

The American Automobile Association is working hard for good roads, which is one of the most important matters that faces an automobile owner in the South.

Another meeting of the local automobile owners will be held at an early date, and it is thought plans will be perfected for an organization of a State association. As the movement is backed by the leading automobile owners, it is sure to go through.



MODEL E, AEROCAR TOURING RUNABOUT.

**BENJAMIN'S FIRST NEW MODEL AEROCAR.**

DETROIT, MICH., May 6.—C. A. Benjamin has just brought out his first new type of car since assuming his position as vice-president and general manager of the Aerocar Company. Although this concern build both water and air-cooled cars, Mr. Benjamin has stuck to his past reputation and is making this initial car an air cooler. The car was designed by Leo Melanowski, chief engineer of the Aerocar Company. It is of the touring runabout type and has a clean cut racy appearance. For practical service this new model will meet a demand that has been given but little consideration. It is the requirement of the suburbanite in having a car with which he can carry a trunk, or two trunks, if necessary, from the station or city to his country home. The nobby rumble seat is convenient for a third person. Underneath it is a space large enough to put a suit case, robes or wraps, where they are under lock and key. Remove two bolts and the whole back can be easily set off and left at home.

Briefly the chassis has a wheelbase of 105 inches with 34x3 1-2-inch wheels. The motor is 20-horsepower, four-cylinder, air-cooled. The new Aerocar multiple disc clutch is used. The transmission is of the sliding gear type, with three speeds forward and reverse. A shaft drive with bevel gear floating differential in the rear axle is used.

The batteries are carried in a box strapped on the running board on the right side of the car. The connection between them and the coil is short, so that it is easy to locate any possible ignition troubles. There is no crawling under the car to find a defective wire. On the left running board a similar box is strapped and is used as a tool box.

The machine is finished in a French gray with black moulding, while the gear is Italian red. The upholstery is of red leather, and instead of the old tufted style has that snappy appearance that is more in keeping with the rest of the car. It makes the seats exceedingly comfortable. The price is \$2,000.

**ENLARGING MITCHELL FACTORY AT RACINE.**

RACINE, WIS., May 6.—The new buildings of the Mitchell Motor Car Company's factory will give between 55,000 and 60,000 square feet of additional floor space, all on the ground floor, and more than half of which will be devoted to machine shop facilities. The construction is like that of the other buildings, cement with saw-tooth roof and fireproof. The increased facilities will enable the Mitchell plant to make 2,200 cars in 1908, exclusive of commercial vehicles, the business for which is increasing rapidly.

Plans for a still larger plant have been made and accepted for 1908, and this work will be begun in the Spring of 1908, just as soon as the frost is out of the ground. J. W. Bate, the company's engineer, is responsible for some special machine tools that will assist materially in the economical manufacture of Mitchell cars. Eight cars per day is the present capacity and this is expected to be increased to ten in the near future.

**AUTO A FEATURE OF A. S. M. E. MEETING.**

At its spring meeting, to be held at Indianapolis, Ind., from May 28 to 31 next, the American Society of Mechanical Engineers will devote one of its entire sessions to the reading of papers on different features of automobile construction. The Claypool Hotel will be the society's headquarters during the meeting, which will be opened by an address of welcome and a response by Prof. Frederick Remsen Hutton, of Columbia University, in the auditorium of the hotel on Tuesday evening, May 28. This will be followed by a social reunion. Wednesday morning will be devoted to a business session to hear the reports of standing and special committees and to vote on amendments. The afternoon session of that day will be taken up with the report of the Committee on Standard Proportions for Machine Screws, and the preliminary report of the Committee on Refrigerating Machines. Papers will be read by Reid T. Stewart on the "Collapsing Pressures of Lap-Welded Steel Tubes," A. F. Nagle, on "The Balancing of Pumping Engines," and "A Comparison of Long and Short Rotary Kilns" by E. C. Soper.

Wednesday evening is to be an "automobile symposium." The papers to be read are entitled "Bearings and Moving Mechanism," by Henry Hess, of the Hess-Bright Manufacturing Company; "Air-Cooling of Automobile Engines," by John Wilkinson, of the H. H. Franklin Manufacturing Company; "Materials for Automobiles," by Elwood Haynes, the Haynes Automobile Company; "Special Auto Steel," by Thomas J. Fay, and "Railway Motor Cars," by B. D. Gray. On Thursday morning, superheated steam practice will be considered from various points of view in four papers by A. R. Dodge, A. M. Greene, E. H. Foster and R. P. Bolton. Thursday afternoon and evening will be devoted to an excursion and reception. Friday morning the members will visit Purdue University, at Lafayette, Ind., *en masse*, and a professional session will be held in one of the university buildings, the subject being a continuation of the consideration of superheated steam practice, four additional papers being read by W. F. M. Goss, G. H. Barrus, H. H. Vaughn, and S. L. Kneass, supplemented by papers entitled "A Hirm's Analysis of Locomotive Test," by S. A. Reeve, and "The Heating of Storehouses," by H. O. Lacount. Other papers are expected to be read at the various sessions, but have not yet been listed. The University of Illinois, situated at Urbana, Ill., has also extended an invitation to the members to make a visit there, where they will be received by Dr. L. P. Breckinridge, professor of mechanical engineering and director of the Government research station.

**SIMPLEX MOTOR CAR CO. JOINS A. M. C. M. A.**

The American Motor Car Manufacturers' Association now has a total membership of 42 automobile manufacturers. The latest concern to join is the Simplex Motor Car Company, of Mishawaka, Ind., makers of the Simplex cars.

In the recent vote of the A. M. C. M. A. only one of the 42 members objected to a strenuous tour, this one preferring a pleasure trip without rigid rules. All but two voted for an average run of 125 to 150 miles per day, and one suggestion was made for a pacemaker. There was not a single objection to the rule preventing the replacing of any parts on a car that would not ordinarily be carried on a regular tour. On this point there was no difference of opinion.

**DOLSON AUTOMOBILE CO. ENLARGES ITS PLANT.**

CHARLOTTE, MICH., May 6.—Removal of the machinery of the plant of the St. Ann (Ill.) Kerosene Motor Company, recently purchased by the Dolson Automobile Company, of this city, is being rapidly consummated, and the new factory building of the Dolson company is making rapid progress toward completion. The new addition to the factory is a very expansive one-story structure, well lighted, and when finished will accommodate 600 workmen.





BUSTLING YORK, THE NIGHT STOP OF THE RUN, IS PICTURESQUELY SITUATED IN THE VALLEY.

YORK, PA., May 6.—At the end of the first day's run of the two-day endurance contest, held under the auspices of the Motor Club of Harrisburg, 15 cars of the 31 which made the trip over the 93 miles of good, bad and indifferent roads, have arrived here with perfect scores to their credit. Up to this point the run has been as successful as any of its character ever undertaken in the East, and is unmarred by serious accident.

Among the contestants are autoists famous the country over: G. Hilton Gantert, of Philadelphia, with his Oldsmobile "Mudlark"; Walter C. White, of Cleveland, with one of the cars which bears his name, and H. A. Grant, of Maxwell-Glidden tour fame. The latter had the only spill so far reported, but luckily escaped with the other occupants of the car.

The cars of the contestants, preceded by those of the officials, left Harrisburg this morning, the first at 8 o'clock and the others at one minute intervals. From Harrisburg the route led through Hummelstown and thence to Lebanon, the first checking station. From Lebanon the route led through Bismarck, Manheim, Petersburg, and Lancaster. The second checking station was fixed at the last named place. From Lancaster the run continued through Mt. Joy, Marietta, and Columbia, where the third checking station was located at the Northern Central railroad bridge over the Susquehanna river. From Columbia the run led

into Wrightsville and thence into York, to the night control at the garage of the York Motor Car Company.

First to arrive was the White pilot car, in charge of R. H. Johnston, of the New York Motor Club, from which confetti was scattered. As it sped through Center square an unknown man was run over, but as the crowd rushed to his assistance he arose unhurt. First of the contestants to come in was the first car to start and the hero of the race, a little "one lung" Cadillac runabout. On the run between Lebanon and Lancaster this car, driven by C. C. Crispin, of Harrisburg, skidded off a loose stone, dove through a fence, carrying part of it away, and then regained the road again without stop or injury. The plucky little car finished with a clean score.



REFEREE E. C. JOHNSON.

Another which met with an accident yet finished with a clean record was a Pullman car driven by James A. Kline, of York. A tree overhanging the road shaved off its top. The "Jonah" of the race was the committee car, a Winton, and No. 13, which had five punctures and came in here on a flat tire, but

ahead of the checking schedule.

There were other hard luck stories. A Mitchell car, driven by W. O. Hickok, of Harrisburg, had a clean record until within a mile of York, where a tire burst, and 42 minutes, and consequently 42 points, were lost. J. E. Sellers, who started with a



THE START WAS MADE FROM HARRISBURG IN MUGGY WEATHER.



CHECKING STATION IN THE PUBLIC SQUARE AT LEBANON.



C. A. GILBERT, THE DRAGON CONTESTANT.



WALTER WHITE, A FREQUENT PARTICIPANT IN RUNS.

Pullman, claimed that his gasoline had been watered and was forced to fall out. Robert Shirk, of Philadelphia, with a Stoddard-Dayton, lost 84 points by getting to Lancaster 42 minutes ahead of time.

The contestants found good roads over most of the course, though a stretch of about a dozen miles between Lebanon and Lancaster was in poor condition. Many of the belated ones made up time on the run over the fine macadam pike between Wrightsville and York. They sped to York, and raced through long lines of cheering spectators to the night control station.

The last of the machines was scarcely in before a heavy shower fell and predictions were made that on the remaining 116 miles of the course the mudlarks would have their inning.

More than 100 of the autos rested here to-night and were entertained by the York lodge of Elks.

At Marietta to-day a grand reception was tendered the contestants. The fire department turned out and bells were rung as the cars passed through. Hanover removed all speed limits.

#### Four Perfect Scores: Pullman, Thomas, Pierce, White.

HARRISBURG, PA., May 7.—Four touring cars finished the two-day endurance run with perfect scores. They were:

- No. 8. Pullman, 40-h.p.; E. G. Irvin.
- No. 18. Thomas, 60-h.p.; S. K. Hamburger.
- No. 32. Pierce-Arrow, 35-h.p.; H. F. Rawl.
- No. 36. White steamer, 30-h.p.; Walter C. White.

In the runabout class there was only one perfect score finishing, E. L. Leinbach, of Philadelphia, with a Stoddard-Dayton, winning the trophy for this class.

The contest committee has decided to award medals and diplomas to the four winning cars in the touring class and then have their names engraved on the cups. These four entrants will be eligible to compete in next year's run, and the car finish-

ing with the nearest perfect score will receive the cup. The same cars will be contestants for other cups to be offered.

Rain fell during the entire day, and many of the clean scores of Monday's run to York were wiped out before the first control at Gettysburg was reached. There were many jokers on the route, the first being a forty-mile run over poor roads from York to Gettysburg in two hours. There were no serious accidents during the entire run, but many cars were badly damaged.

The club committee which handled the affair so successfully consisted of R. C. Halderman, chairman; W. R. Douglas, secretary and treasurer; C. C. Cumbler, Andrew Redmond, S. K. Hamburger, George G. McFarland, and E. G. Irvin. The officials included E. C. Johnson, of Philadelphia, as referee; C. A. Woolson, another Philadelphian, as starter, and R. H. Johnston, of New York, as pilot.

The Philadelphia *Inquirer* to-morrow will make this comment: "There were several brilliant features of the last day's run, notably the performance of Walter C. White. He drove the best race, speaking from a conservative touring standpoint, of any man in the contest, reaching controls just a few moments before his car was due. The 'race bug' developed in many of the contestants, but Mr. White did not seem to mind how many cars passed him. It was the 'cut loose' policy of many drivers Monday, when the run was absolutely easy, that killed off their chances to-day. Mr. White's run should prove a lesson to them.

"As an automobile education to the people of the towns through which the run passed the event was most successful. Everywhere the cars were greeted with cheers and flags. A notable sight was the number of horses brought along the roads by farmers who wished to make them familiar with the machines. Every courtesy was extended by the farmers, and the caution with which cars were driven when a frightened horse was encountered left a most pleasant impression."

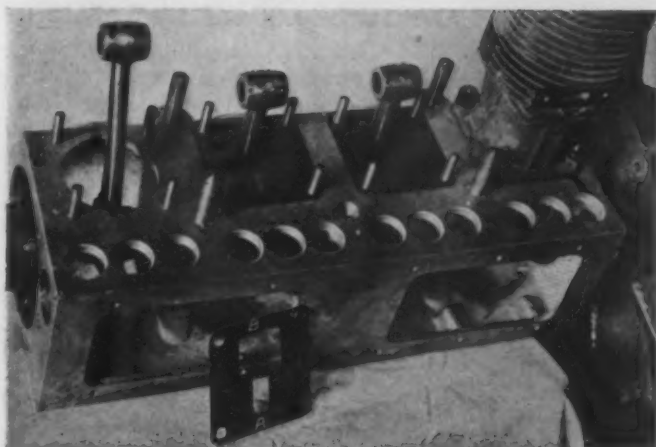


A. A. JONES, THE FORD ENTRANT, HAD TIRE TROUBLE.



H. A. GRANT, ONE OF THE MAXWELL PARTICIPANTS.





OIL BAFFLE PLATES USED IN THE AIR-COOLED FRANKLIN.

**IMPROVED LUBRICATION OF FRANKLIN MOTORS.**

Three years have now elapsed since the adoption of the auxiliary exhaust which is a feature of the Franklin air-cooled motors, and the hundreds of cars fitted with it that have been in daily use during that period show that it effectively accomplishes the design of its inventor—that of increasing the efficiency of the engine and rendering its cooling certain under the most adverse conditions possible. It has been found to have one slight drawback, however, owing to the fact that it is situated on what may be termed the non-working side of the motor—that is, the side of the cylinders that only receives the stress of the compression stroke, which is very light as compared with that of the explosion stroke. It will be apparent that with the splash system of lubrication, the oil is always thrown to the non-working side of the cylinder, and must work its way round to the other side, and as the Franklin auxiliary-exhaust is on the former, it was found that some of the oil was wasted by being discharged through it. This was particularly the case when there was an excess of oil.

To overcome this a very simple device has been evolved, and it not only does away with the objection in question, but renders the lubrication as a whole far more effective. It is termed an oil baffle-plate, and, as will be seen from the accompanying photograph of a dismounted Franklin motor, it consists of nothing more or less than a light steel stamping through which the connecting rod works. It prevents the oil from being splashed on the side of the cylinder that carries the auxiliary exhaust port and causes the greater part of the oil to be thrown against the

working side of the cylinder. Another advantage is to be found in the fact that it permits of a much higher level of oil in the crankcase, thus providing better lubrication for the big ends of the connecting rods, and maintaining a larger supply in reserve in case of the failure of the oil pump. Nor does this excess of oil mean smoking and carbonization, as is usually the case, as only a certain amount is permitted to enter the cylinder.

**NEW JERSEY NOW EMPLOYS A SLEUTH CAR.**

TRENTON, N. J., May 7.—State Automobile Commissioner Smith to-day placed in service a high-speed auto, and inspectors will tour the State in the machine to chase speed violators. To prevent watchers from spotting the sleuth car and giving an alarm, the color and number of the State machine will frequently be changed.

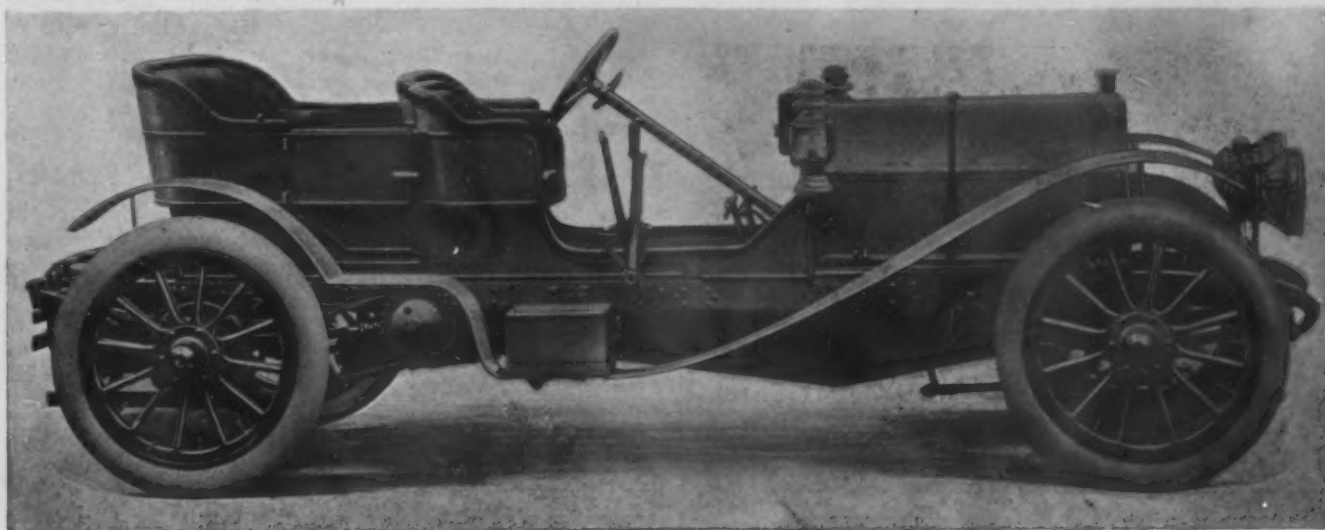
Governor Stokes has not yet signed the bill appropriating \$5,500 for the machine, and there is considerable adverse comment because of the premature purchase.

**OLDSMOBILES TO HAVE A HOLIDAY REUNION.**

General John T. Cutting, New York agent of the Oldsmobile, announces that there will be a reunion of Oldsmobilers at the Empire City track, Yonkers, N. Y., on Decoration Day. The parade will start from the company's Broadway store at 10 A.M., and luncheon will be served on arrival at the Empire track. A drawing for a \$2,750 Oldsmobile touring car will take place, and all Oldsmobile owners participating in the parade will be eligible, with Oldsmobile selling agents or representatives barred. However, it will be necessary for participants to fill out a card supplied by the Oldsmobile Company, of New York, giving number of engine and type and filing same before May 28.

**NEW TYPE RUNABOUT FROM STEARNS FACTORY.**

The latest product of the F. B. Stearns factory at Cleveland, O., is an attractive four-passenger runabout, an illustration of which is given herewith. The chassis construction is the same as is used in the firm's standard runabout, but the body is novel and interesting and calculated to attract considerable attention. It has seating capacity for four people with tonneau attached, but can be converted into a two-passenger runabout by the removal of the tonneau. It is constructed with a very rigid oak frame covered with sheet aluminum, and the upholstery is a dull black waterproof leather without tufting. Operator's seat is placed six inches ahead of the passenger's seat, in order there may be no interference with the operations of the driver. The weight of the car is distributed at the center of the frame, giving exceptional riding qualities and making the steering easy.



THE LATEST INNOVATION IN HIGH-POWERED RUNABOUTS—THE STEARNS FOUR-SEATER.



THE MAXWELL COMMERCIAL DELIVERY CAR.

### IMPORTERS' EXHIBITION IN THE GARDEN.

There will be three automobile shows in New York next season. The Importers' Automobile Society, which only came into being last month, has ceased to exist, its promoters having decided to throw in their lot with the older Importers' Automobile Salon and aid them in holding an automobile show for foreign machines only in Madison Square Garden, presumably towards the end and perhaps the last week of the year. The decision was arrived at on Monday at a meeting in the club-rooms of the A. C. A. under the chairmanship of Gaston Rheims.

Those who have subscribed to the action are André Massenat (Panhard), Gaston Rheims (C. G. V.), Paul de la Chesnaye (Zust), W. H. Barnard (Pilain and Delahaye), Alexander Thakara (Westinghouse), E. Lillie (Itala), Paul Lacroix (Renault), Percy Owen (Bianchi), Emile Bloch (Motobloc), E. B. Gallaher (Brasier), Wm. Walker (La Buire). It is announced in addition that three or four other firms that were not able to attend the meeting will act in accordance with the firms above mentioned and would forward application at once for membership in the Importers' Automobile Salon.

"All members of the Salon," said E. R. Hollander to THE AUTOMOBILE representative, "will exhibit at the foreign show, and will take part in no other event. Doubtless a number of the smaller importers will join us—all will be accepted on a basis of equality—and we are certain of the finest display of foreign machines that New York has ever seen. It appeared to us that it was useless to form another importers' association when one had already been in existence for four years."



A DAY'S DELIVERY OF PEERLESS RUNABOUTS.

The picture shows the cars ready for delivery to customers from the New York City branch of the Peerless Motor Car Company.

### MARSH RIM PLANT TO BE LOCATED AT AKRON.

AKRON, O., May 6.—The Marsh rim plant will be moved from Columbus to Akron as soon as enough stock ahead can be accumulated to permit the manufacturing to be discontinued long enough for the change. Nearly 15,000 sets of Marsh rims have been made by the Diamond Rubber Company for the present season, and increased facilities are necessary, which explains the removal from Columbus, where the rim is being manufactured in the works formerly known as the Bryant Steel Wheel and Rim Company.

### ASSOCIATION TO CONDUCT TRACK MEETS.

The United States Motor Racing Association has been incorporated in New York State with a \$5,000 capitalization. Joseph N. Gaites, William H. Pickens, Fred T. Bailey and W. H. Oviatt are named as the incorporators. The first meet of a series in various parts of the country is scheduled for the Point Breeze track, Philadelphia, May 24 and 25, a 24-hour race for fully equipped touring cars and touring runabouts to be the feature. The meets will be conducted under the rules and sanction of the A. A. A.



NEW ROYAL FACTORY NOW BUILDING AT CLEVELAND.

The view shows the progress being made on the main factory on Gordon Park boulevard. The Royal Motor Car Company expects to have it in operation by the middle of the summer. This will add substantially to the already large equipment of this company.

### ALL FORD INTERESTS TO BE UNDER ONE ROOF.

DETROIT, MICH., May 6.—The Ford Motor Company has purchased the entire assets of the Ford Manufacturing Company, located on Bellevue avenue. The latter concern was organized in November, 1905, and incorporated for the purpose of making under contract motors, transmissions, axles and other parts of the Ford runabout. Recently this plant had been held under lease, and its location about four miles from the Ford Motor Company's factory caused considerable inconvenience. With the absorbing of the younger by the older concern, there will come the beginning of a huge plant on the Highland Park property, consisting of sixty acres, recently purchased by the Ford Motor Company. Henry Ford contemplates the building of the largest automobile factory in the world, and in the financing of the plan James Couzens, secretary and treasurer of the company, is entitled to great credit for his share in this undertaking, as well as in the general conduct of Ford finances.

### MORGAN MAY RUN MEET ON GALVESTON BEACH.

GALVESTON, TEX., May 4.—W. J. Morgan, the well-known promoter of automobile race meets and hill climbs, has been in Galveston for the past week conferring with representatives of the Galveston Automobile Club and the Business League. The proposition of conducting a January meet on the Galveston beach was presented and is now under consideration. Mr. Morgan is now on the way back to New York on the steamer *Denver*.



## BRIEF ITEMS OF NEWS AND TRADE MISCELLANY

The St. Louis Automobile Manufacturers' and Dealers' Association has decided to hold a show from December 14 to 21.

President Asa Paine, of the Minneapolis Automobile Club, has placed his order for a Winton Model M. Mr. Paine has been a Winton devotee for several years.

Work on the big plant of the Maxwell-Briscoe Motor Company at Newcastle, Ind., has been begun, the first of the steel girders to compose the framework of many tons being raised last week.

Messrs. Pirelli, who have recently opened an American agency at 206 Broadway, New York, state that Pirelli tires will be used on the Itala car entered in the Pekin-Paris automobile competition.

The Waterloo Automobile and Supply Company, Waterloo, Ia., has purchased the business of the William Galloway Company, that city, and will conduct an enlarged garage business in connection.

The T. Alton Bemus Company, Inc., of Boston, makers of the Bemus twin-ball timer, is now located in its new quarters at 358 Atlantic avenue, having recently removed from 133 Oliver street.

In the May 2 issue of THE AUTOMOBILE a typographical error occurred in the advertisement of the Dolson Automobile Co., Charlotte, Mich. The wheel specifications of the Dolson "Cannon Ball" should read 36x4 1-2 inches.

The Bridgeport Vehicle Company, of Bridgeport, Conn., has recently made deliveries of special limousine bodies to N. W. Bishop and E. G. Burnham, of Bridgeport, Conn. The company makes a specialty of high-class limousine bodies.

E. F. Dean, M. D., the owner of a Model E Mitchell car, recently covered 123 miles on twelve gallons of gasoline. The run was done under ordinary conditions of the doctor's practice, with the stopping and starting it entailed, the distance being recorded by a Jones Speedometer.

Organization has been completed of the Morris Manufacturing Company, at Omaha, Neb., with a capital of \$200,000, to construct resilient wheels under the patent of J. H. Morris. Organizers of the company are C. A. Sweet, John M. Dougherty and William J. Coad.

At the automobile exhibition which recently took place at the Agricultural Hall in London, England, Continental tires were on 35 per cent. of the cars exhibited; the nearest competitor was fitted to 29 per cent.; another pneumatic tire showed on 9 per cent., and fourteen other tires completed the equipment of the rest.

A 40-horsepower Lozier will be entered in the sealed bonnet contest next month by the Lozier Motor Company. This car will be one of the regular stock cars which has been run over three thousand miles this season. This decision is in line with the policy of the Lozier Motor Company to enter all contests for stock cars promoted by the A. A. A. or A. C. A.

The new Viking car, mentioned in the April 25 issue of THE AUTOMOBILE, sells for \$2,500, and not \$3,000, as was erroneously stated. According to A. R. Bangs, of Boston, maker of the Viking, the car, which is of 40 horsepower and has a 120-inch wheelbase, was designed to sell at

\$2,500, and the first ones have been disposed of at this figure.

The Thomas B. Jeffery Company has shipped from the Rambler factory at Kenosha, 7,500 enameled metal signs to put up warnings to motorists on highways in all parts of the United States. The signs are sent in batches to Rambler agents, with instructions to properly letter them, giving necessary information to tourists, and to place them in position without delay.

The Waltham Manufacturing Company has secured the services of Dr. A. D. Hard, of Marshall, Minn., to demonstrate its friction drive buckboard to the physicians of the Northwest at the State medical societies this summer. Dr. Hard is an automobile enthusiast and has the name of being the first physician west of the Mississippi river to use an automobile in country practice.

Automobiles will soon be supplanting sledges and dogs in the far North, judging by a news item from Alberta, Canada, stating that nine motor cars, with more ordered, are now surprising the natives on that far Canadian frontier. According to a Medicine Hat journal, eight Maxwells are in commission in that town of 4,000 population, or one for every five hundred inhabitants.

Elwood Haynes, the designer and manufacturer of Haynes automobiles, has calculated that the impact of a touring car striking an immovable object at sixty miles an hour is equal to the shock it would receive if it fell from the top of a skyscraper. The shock given to the mechanism of an automobile with the ordinary clash gears when a careless change is made from the high at thirty miles an hour to the middle gear at fifteen miles an hour, is equal to the impact that the car would sustain by a vertical fall of seven feet.

That the Automobile Club of Buffalo will make an effort to retain the Glidden trophy this year is shown by the fact that a team to represent that organization has already been promised by its members. Four cars are certain to be entered, and several more may be added to the assured entries before the tour starts. The first Buffalo entry has already been made by George S. Salzman. He will drive a Thomas Flyer of 60 horsepower. Although not superstitious, Salzman was rather gratified to find that his car will be numbered 9. Last year he drove a Thomas Flyer through the Glidden tour with a perfect score, and then, as it will be this year, his car bore a big "9" on the radiator.

## NEW AGENCIES ESTABLISHED.

The LaGrange Automobile Company, LaGrange, Ga., recently organized, has been appointed local agent for the Reo.

The Philadelphia Motor Car Company, with salesroom and garage at 236 North Broad street, that city, has been appointed agent for the Frayer-Miller.

The Sweeney & Nail Auto Co., 59-61 Court street, Brooklyn, N. Y., has secured the Greater New York agency for the Kissel-Kar made at Hartford, Wis.

The Aerocar Company, of Detroit, has established the following new agencies: A. D. Rivers & Co., Toledo, O.; H. A. Harmon, Portland, Me., and the American Auto Company, Cleveland, O.

The Reimers' Motor Company, Louisville, Ky., has been organized with salesrooms at Baxter avenue and Broadway, that city. The company will sell the Logan, Gale, Aurora and C. S. lines.

Boston has another new agency, the Puritan Motor Company, which has established headquarters at 43 Columbus avenue, in the Park Square auto station. The company is agent for the Dolson and the Mason.

## PERSONAL TRADE MENTION.

Charles Schmidt, designer of the Peerless Motor Car Company, who has been spending the past six weeks in Europe, has returned home, arriving in New York last week.

A. W. Robbins, New York manager of the Aerocar Company, last week visited Washington and placed an Aerocar agency with J. B. Maxwell, 829 Fourteenth street, N. W.

L. H. Perlman, New York representative of the Welch Motor Car Company, entertained a score of personal friends at the closing dinner of the Pleiades Club, at the Hotel Astor, last Sunday evening.

J. R. Jamison, formerly connected with the Pope Motor Car Company, has joined the selling force of the Aerocar Company, of Detroit, as has also W. H. Howe, who has been associated with the Chicago branch of the Corbin Motor Vehicle Company.

## RUSHMORE LAMPS ABROAD.

Rushmore Lamps, Limited, is the title of the English branch of the Rushmore Dynamo Works, of Jersey City, N. J., and the establishment at 49 Rupert street, Shaftesbury avenue, W., London, gives ample evidence of the favor with which these American lamps have been received abroad.



RUSHMORE LAMPS' ENGLISH BRANCH.

Their prompt acceptance on the other side is apparent from the fact that they have already been adopted as the standard equipment of all Fiat cars in England, India and the Colonies; they are carried in stock by the agents of such prominent cars as the Panhard, Isotta-Fraschini, Martini, Mer-

cedes and Wolseley, and are supplied on numerous orders. Rushmore agencies have recently been established in Berlin and Milan and the excellence of the lamps is probably most strongly attested to by the fact that Continental manufacturers are making haste to copy them. At the recent Agricultural Hall show in London, the sole American accessories exhibited are said to have consisted of a few brands of lubricating oils and the Rushmore lamps. They are used by royalty and many of the lesser lights of the nobility both in England and the Colonies.

#### INFORMATION FOR AUTO USERS.

**New and Ingenious Accessories.**—At a time when every automobilist is casting his eye over his machine and wondering what additions he needs to his outfit for the coming season, it is opportune to call attention to some of the new and useful instruments handled by the Auto Supply Co., 1733-1737 Broadway, New



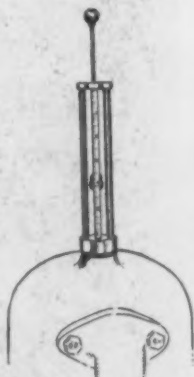
BROWN  
COMPRESSOMETER

York. The compressometer is a little instrument which will tell accurately the compression of the cylinders. The illustration shows the nature of the apparatus, which has simply to be screwed into the cylinder in the place of the spark plug. On turning the motor over slowly by hand, the compression is registered accurately on the dial. Nothing simpler could be imagined, and there is a degree of accuracy altogether unattainable by any of the older expedients.

Timing the ignition or firing point of a motor is a delicate operation, but one that must be performed if good results are to be obtained. The instrument is placed on the top of the cylinder and the metal rod passed through the compression cock. The position of the piston is indicated with accuracy by a movable stop on the rod at each side of the scale. One side of the scale is marked with English, the other side has metric measurements. The rod is eighteen inches long and the scale six inches, or 150 mm., in length. For measuring the stroke of pistons the instrument is particularly handy. Its method of use is obvious.

The good features of the flexible valve remover are its simplicity and the ease with which it can be operated in inaccessible positions. It would be difficult to imagine anything more simple: a U-shaped piece of metal with a chain attached, and a lever bar with two or three double slots bored through it. One end of the slot allows the chain to pass easily, the other side holds the links prisoner.

Smooth-On is a preparation not entirely new to the mechanical world, but one that has not previously entered into the

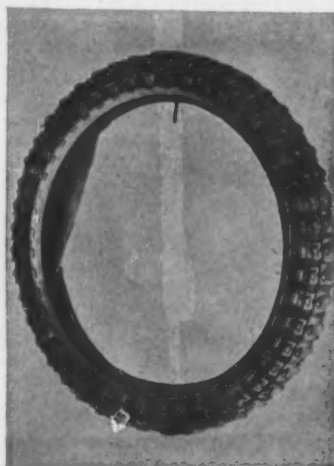


DEVICE FOR TIMING  
FIRING POINT

domain of the automobilist. It is a cement of chemical iron compounds that withstand fire, water, gasoline, steam or oil. When hard it becomes a metallic iron that expands and contracts the same as iron. Its chief use is for repairing cracks in a water jacket or leaky radiators. The defective part is first cleaned and the crack and surrounding metal are heated either by running the engine or by a gasoline torch, and while the metal is hot the cement is applied. If the defective part has been sufficiently heated the cement will run into the opening and harden rapidly. When hardened it possesses the properties of iron and can be smoothed up with a file.

Another very useful article consists of a pair of universal shears with which it is possible to cut any diameter circle or angle as easily as along straight lines. It is particularly handy in making gaskets, shimming brasses, etc.

**Flexible Steel Armor for Tires.**—The Kimball Tire Case Company, of Council Bluffs, Iowa, which has been making steel tire armor to fit ordinary automobile tires for the last two years, has brought out a new design for covering Dunlop or Good-year tires. The accompanying cut shows



KIMBALL STEEL TIRE ARMOR.

the manner in which a steel covering is attached to a quick detachable tire. The rings into which the clasps hook are curved in such a way that they fit tight between tire and other ring which are with the rims of that class and when tire is removed the armor stays on. Tire and inner tube can be changed the same as it can without the armor. When tire is in place on wheel there cannot be a blowout or rim cut no matter how rotten the tire is.

**Triumph Magnetic Gage.**—A magnetic gage which keeps a record of the gasoline put into and removed from a tank has been produced by the Boston Auto Gage Company, 14 Old South Building, Boston, Mass. It consists of a tube depending from a head that may be screwed into a bushing connected with the tank. On the under side of the head is a chamber in which is located a magnet rotatable above the end plate at the upper end of the tube, the magnet having suspended from it a ribbon shaft of rustless material embraced by a float metal that turns the ribbon and magnet more or less according to the quantity of gasoline in the tank. The head is chambered at the top to receive a small needle carrier

or compass box shown detached in the small figure at the right. This box has a dial and the needle is held in alignment with the magnet, indicating the



TRIUMPH  
MAGNETIC GAGE

amount of gasoline in the tank. This feature, in itself, is a very useful one, and gives excellent satisfaction to users of this gage. When the car is left, the compass box can be removed from the top of the gage and carried away in the pocket. The magnet needle is then automatically locked in position. When the box is again put on the gage it immediately unlocks the magnetic needle, and if any change has been made in the quantity of gasoline the difference will be at once indicated.

**Moon Roller Bearing, Apex Friction Brakes.**—By the scientific application of several well-known principles, the Moon Brake Company, Third and Porter streets, Detroit, Mich., have evolved a simple and compact type of brake for which much is claimed. The essentials of the device will be plain at a glance at the accompanying illustration of it. The apex formation provides nearly three times as much friction surface as a flat band or drum. The friction is caused by a quadruple eccentric, the power again being doubled by an eccentric within an eccentric, producing a far greater leverage than can possibly be obtained by means of single cams or link motion. The entire brake is enclosed by a dust-proof housing and runs in grease.



MOON APEX FRICTION BRAKE.

It may be applied as little or as much as desired, and can either be locked or released instantaneously. The makers claim that a set of Moon brake shoes will outlive any car made. A Winton car fitted with the Moon brake is used in Detroit for demonstrating.

The Pope Manufacturing Company, Hartford, Conn., has just sent forth the 1907 edition of its accessories catalogue, containing in about seventy pages a very complete description of automobile accessories and parts of both foreign and domestic manufacture.